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## WILLIAM HENRY EDWARDS.

For thirty years the name of Mr. William H. Edwards was familiar in the scientific world as one of the two most notable students of the Butterflies of North America, the other being the now venerable and venerated Dr. Samuel H. Scudder, of Cambridge, Mass. Both of these men spent the greater part of their lives in the preparation and production of magnificent works on our diurnal Lepidoptera, to which we owe our present knowledge, incomplete though it may be in many respects, of these beautiful and interesting creatures.

Mr. Edwards, born at Hunter, N. Y., on the 15th of March, 1822, was the son of William W. and Helen Ann Mann Edwards. His father was one of the fifteen children of Judge Timothy Edwards, whose grandfather was the Rev. Jonathan Edwards, of Stockbridge, Mass., the progenitor of many able contributors to American intellectual life. Mr. W. W. Edwards built a tannery at Northampton, Mass., in 1794, and sent his leather to Boston; in 1816, having exhausted the supply of hemlock bark in the Connecticut valley, he removed to Hunter, in Greene Co., New York, and re-established his business on the Schoharie Creek, where he drew his supplies from an estate of 1,200 acres of hemlock forest in the Catskill Mountains. Here our friend was born and brought up, spending his early years in the midst of beautiful surroundings and imbibing a love of nature which continued throughout his life. From the village school he was sent to Williams College, Mass., and completed his course there in 1842; he then studied law in New York, and was admitted to the bar in 1847, after which he made his home at Newburg, N. Y. Subsequently he became interested in the coal fields of West Virginia, and removed to Coalburgh, where he was President of the Ohio and Kanawha Coal Company. He was an extensive land owner in the Virginias of the early days, a builder of railroads, an opener of coal mines, and throughout all his life active in the affairs of the community among whom he dwelt. Though thus busily engaged in commercial pursuits, he always found time to devote to the

study of butterflies and to the preparation for publication of the results of his investigations. His first contribution to the pages of the "CANADIAN ENTOMOLOGIST" appeared in the third number of the first volume, October, 1868, and his one hundred and seventieth in the 30th volume, January, 1898. During this period he also wrote a number of articles, chiefly descriptive of butterflies, which appeared in the Proceedings and Transactions of the American Entomological Society and "Papilio." His first published work, "Voyage Up the Amazon," gave an account of a trip that he made up the great river in 1846, not long after he had left College; it is a delightful record of visits to a number of places where the author employed himself in collecting butterflies, birds and other interesting objects, and is full of vivid descriptions of luxuriant tropical vegetation and the strange creatures that make their abode in the forests and thickets. So true is the narrative then written that the publishers, the Murrays, of London, England, still continue to issue the book as the most reliable guide for a naturalist exploring the river. It was first printed in 1847; the edition before us is dated 1861, and there is still a steady sale of the book. This is certainly a remarkable record for a description of travels written by a young man just out of college.

His *magnum opus*, however, the work which will long continue as a monument to his memory, is "The Butterflies of North America." In April, 1868, the first part was issued and at once commended itself to Entomologists everywhere by the exquisite beauty and finish of the plates and their faithfulness to nature. In July, 1872, the first series, forming a large quarto volume with fifty plates was completed. The second series, containing fifty-one plates, was begun in May, 1874, but not finished until November, 1884; the less frequent issue of the parts being more than compensated for by the increased value of both plates and letterpress. When the work was begun, as Mr. Edwards stated in his preface, little or nothing was known of the eggs, larvæ or chrysalids of any except a few of the commonest butterflies, and accordingly his first volume illustrated only the perfect state. In 1870 he made the notable discovery that eggs could be satisfactorily obtained by confining the female butterfly of any species with the growing food-plant of its larva, and at once he began the study of the life-histories of a number of species previously known only in the imago state. The results of these studies are admirably set forth in the pages as well as on the plates of the second and third series; on these are accurately depicted eggs and larvæ in their different stages, as well as chrysalids and imagoes. Many wonderful discoveries were made during

these investigations, among the first being that of the seasonal trimorphism of *Papilio ajax* and the dimorphism of *Graptia interrogationis* and of *Graptia comma*. The process of breeding was soon taken up by Mr. Edwards's friends and correspondents scattered over North America, and, aided by the general extension of railways over the continent, he was able to get eggs of butterflies from widely distant localities and to follow them successfully through all their stages. It is due to his efforts that the reproach of ignorance of the preparatory states of our butterflies has largely been removed, and though much even now remains to be learnt, vast progress has been made. The first part of the third series was issued in December, 1886; the eighteenth and last in 1897. Far from showing any decline from the author's high standard of excellence, the last issues were regarded at the time as the climax of good work, both on the part of the writer and the artist. In his third volume nearly half of the fifty-one plates are devoted to the alpine or subarctic species of the Satyrinæ, and every species of North American Chionobas, except the Labrador *Taygete*, is figured; of twelve species the various life-stages are fully described and portrayed with a wealth of detail of larval characteristics. As the author states in the preface, "Until these plates appeared no *Erebia* and no *Chionobas*, except *Semidea*, either in Europe or America, was known in its preparatory stages." All through Mr. Edwards was fortunate in having his wishes ably carried out by his artist-assistants, one of whom, Mrs. Mary Peart, not only drew most accurately nearly all the plates, but in order to do so satisfactorily, reared a large number of the caterpillars; the exquisite colouring by Mrs. Lydia Bowen could not be surpassed. The three large volumes make up a work on the life-histories of butterflies which has no equal anywhere. The accuracy and beauty of the plates are all that can be desired and the pages are filled with original descriptions and observations of many of our rarest butterflies, as well as particulars previously unknown of a large number of more familiar species. It will long continue to be an authoritative book of reference and to form the foundation of all further studies of these most interesting and lovely creatures.

Mr. Edwards was seventy-five years old when he gave up his studies of butterflies, feeling, no doubt, that his advanced age precluded him from carrying on further investigations with the ability and success that he had so remarkably displayed. Far from being idle, however, he became a spirited combatant in the Shakespearian controversy, and in 1900 published

a large volume on the subject, under the title, "Shaksper not Shakespeare." His last work was the compilation of a genealogy of the Edwards family, published in 1903.

For many years during the period of his active studies all new specimens of North American butterflies received by the Smithsonian Institution of Washington were sent to him for description and classification, and also all collections of North American examples possessed by the Imperial Russian Government and any new species from this continent that came to the British Museum were sent to him for identification. He thus became the author of a large number of new species, whose names, conferred by him, will in nearly all cases endure. His own extensive and valuable collections were purchased a few years ago by the Carnegie Institution at Pittsburg and are now in the care of Dr. W. J. Holland, the Director. Mr. Edwards kept up a world-wide correspondence during a long period of years and was an active or honorary member of many scientific societies both in America and abroad. In November, 1868, he was elected an honorary member of the Entomological Society of Ontario, being one of the very first whom our Society recognized as a leader in Entomology, and whose name it felt proud to inscribe on its roll of distinguished members. He was a man of profound and varied learning, a thorough scholar, an earnest student of nature, gifted with more than ordinary powers of observation. To those who knew him well he was endeared by many attractive characteristics; kind, open-hearted, cheery and courteous, free from pride and ostentation, widely respected and foremost in all that pertained to the welfare of the community in which he lived, he attained to a venerable old age and has left behind a fragrant memory that will not soon pass away. On the 2nd of April, 1909, he died at his home in Coalburgh, West Virginia, at the age of 87 years.

C. J. S. BETHUNE.

#### CENTRAL EXPERIMENTAL FARM, OTTAWA.

It is gratifying to learn that Mr. ARTHUR GIBSON's position in the Entomological department of the Experimental Farm at Ottawa is not affected by the recent appointments to fill the place of the late Dr. Fletcher. He is a member of the "Inside Civil Service" of the Dominion, and his position is permanent, whatever other changes may take place. It is much to be hoped that his knowledge and experience may long be available for the experimental and research work carried on at the Farm, and for the maintenance of the extensive correspondence with enquirers respecting insects in all parts of the Dominion.

## GALLS FOUND IN THE VICINITY OF TORONTO.—No. 4.

BY DR. WILLIAM BRODIE, TORONTO.

*Rhabdophaga strobiloides*, Walsh; *Cecidomyia strobiloides*, O. S.

This is a common willow gall in the vicinity of Toronto, restricted to *Salix humilis*; the galls are very uniform in size and form, usually top-shaped, some inclining to spherical, a little oblate below and prolate above, and as the female oviposits but one egg in the terminal bud of the willow shoot, the galls are terminal and monothalamous.

The gall is a rather tightly and regularly arranged mass of from 70 to 80 aborted leaves, representing perhaps about 1 m. of the leafage of a normal branch.

This has been called the "pine-cone-like-gall"; there may be a suggestion of a resemblance to cones of *Pinus resinosa*, but not to cones of *P. strobus*.

From December 4, 1883, to March 21, 1898, nine annual collections of galls were made, all in the vicinity of Toronto, in all about 1,000 specimens. The average measurement of 200 galls was 12 mm. x 15 mm., and the length of the deformed part of the branch, included in the gall, around which the aborted leaves were packed, was 6 mm.

The larvae occupy cells central in the galls, formed by the folding of aborted leaves; they are tightly wrapped up in these, head downwards, and no doubt the irritation from the activity of feeding by gnawing the growing end of the twig causes the aborting of the leaves and the development of the gall.

The larvae mature in the fall and are about 6 mm. long, of a straw colour inclining to orange. They pupate early in the spring or late in the fall, and the pupae are closely wrapped up in fragil silken cocoons.

The imagoes usually emerge during the first week in May; it may be occasionally that the larvae emerge from the gall in the fall, hibernate among leaves or other rubbish on the ground, and pupate in the spring; anyway, in two cases, when I had collected the galls early in the fall, I found living mature larvae on the bottom of the jar.

Although the date of emergence of the imago is usually early in May, I found it range from April 4 to May 15. No doubt the date depends on the temperature of the season. When the temperature is warm the

imagoes do not live long ; I never could keep them in captivity more than three days, but when kept in the cold I have had them over a week, and when brought into the warmth they were perfect and active ; when kept in a large glass jar they paired readily, and the females oviposited in the terminal buds of living willow twigs. I tried them with different kinds of food, sugar, starch, glucose, cherry-tree gum and water, but I could not get them to eat. I do not think that during their brief imago life they either eat or drink.

There are four species of inquilines more or less common in this gall, the most noteworthy being the minute and beautiful *C. albovitta*, Walsh. I found mature larvæ of this inquiline resting in the downy folds of the aborted leaves, well within the gall. They are cylindrical in shape, slightly flattened ventrally, of a pale orange colour, and about  $1\frac{1}{2}$  mm. long ; I could find no evidence of feeding. The date of emergence ranged from April 14 to June 23 ; this extreme range may have been from artificial conditions, although I tried to secure natural conditions as much as possible. I found them quite numerous ; one season I had 200 specimens from 54 galls; another season, 1892, I had 163 specimens from 35 galls.

The common sawfly inquiline emerged sparingly, every season about 2 to 100 galls. A small beetle and a small plume moth similar to the species that is inquiline in galls of *R. triticoides*, emerged rarely.

Among the hymenopterous parasites was the ichneumon, *Pimpla annulipes*. It was not common, and there was a suspicion that it was parasitic on the sawfly larvæ.

Two species of *Torymus*, one with an especially long ovipositor, both resplendent in metallic green and blue colors, emerged about the middle of June.

Two species of small Chalcid parasites emerged a little later than the *Torymus*, and it was thought that at least one of them was a secondary.

The geographical range of this gall is ample ; it extends far to the south, and is common over Ontario. I have found it in Algonquin Park and in the Temagami District, and have galls from Southern and Northern Manitoba, from Alberta and from North Saskatchewan.

There are many complicated and interesting problems awaiting the student of Entomology, in working out the life-histories and interrelations

of the occupants of galls. The living feeding upon the living, without pain or apparent inconvenience, and all this while in the larval form.

Shall we say the relations are physiological and not pathological in any sense? The living plant fed upon by the gall-producer and the inquilines, these by the primary parasites, and these again by the secondaries. A harmonious system of eat and be eaten, and strangely at the same time the eater is often the eaten, and although, in the end, it means death to the eaten, it is not so shocking to our sensibilities as the cat enjoying the agonies of the tortured mouse or the sportsman triumphing over the "fluttering gory pinion."

*Rhabdophaga siliqua*, Walsh ; *Cecidomyia salix-siliqua*, Walsh.

Galls nearly terminal on upland willow twigs (*Salix humilis*), flask or rather horn-shaped, usually curved, ending above in a slightly-curved beak, out of which the occupants emerge. The galls are aborted buds, and when overtapped by the twigs lie closely to them. The galls are often striated, of a greyish-green colour, corresponding to the colour of the twig, and rarely bear a few leaves. The average of 30 galls collected in the fall of 1882 was  $7 \times 12$  mm. From this lot collected Dec., 1882, the producers, *R. siliqua*, emerged May, 1883, and towards the end of June numerous specimens of the Chalcid parasite, *Torymus splendidus*, emerged. Walker described and named this beautiful *Torymus* from specimens collected at Hudson's Bay, which may be accepted as presumptive evidence that this gall may be found there. In any case the geographical range is large. This gall is more or less common over Ontario where *Salix humilis* is found ; it is more or less common in North York, Muskoka, Algonquin, Temagami, and along the Montreal River on *Salix discolor*. During the fall and winter seasons of 1886 and 1887, I received several parcels of this gall from Northern Manitoba, collected from some species of willow ; they were in every particular similar to Toronto galls, but no producers emerged from them. In the spring of 1887 I received from Mrs. W. A. Ducker a parcel of galls collected at Banff, Alta., from a species of willow ; in size and shape they were identical with Toronto and Manitoba galls. Mrs. Ducker wrote : "The galls are on the ends of willow branches. I do not know the willow, but both willow and galls are common all around Banff." Producers emerged

from these galls during the last week of April, 1887, and I failed to separate them from Toronto specimens.

From 1883 to 1888 several annual collections of galls were made, all from *S. humilis*, from Toronto and from a locality 35 miles north. From these emerged numerous specimens of the producer, the parasite *Torymus splendidus*, and a few specimens of the Chalcid parasite *Encyrtus bucculatricis*, Howard, a species seldom reported as occurring in Ontario.

*Rhabdophaga cornu*, Walsh, *Cecidomyia salix-cornu*.

These galls are deformed lateral buds towards the ends of branches of upland willow (*Salix humilis*). They vary much in form and size, from semi-cylindrical, measuring 9 x 25 mm., to somewhat ovoid, measuring 7 x 10 mm.; the average of 200 galls was 8 x 20 mm. The galls are flask-shaped, slightly curved, rounded at the base, tapering towards the upper end, which ends in a slightly curved beak, out of which the occupants emerge. They resemble the galls of *R. siliqua*, but are considerably larger. They are hard and woody, of a greyish-brown colour resembling that of the branches, and often bearing leaves, occasionally branchlets 1 to 3 inches long, and rarely ♂ and ♀ catkins. On August 1st, 1893, I found these galls full size, but soft, easily cut with a knife, and of a greenish-yellow colour corresponding to that of the branches of the season. Annual collections of galls were made from 1883 to 1893—most of these from near Toronto, some from distant points, Port Sydney, Muskoka, Temagami, and other localities. The date of emergence of producers varied from April 26 to May 12; the parasites *Torymus splendidus*, Walk., and *Encyrtus bucculatricis*, Howard, emerged about 20 days later, and still later emerged two species of Chalcid parasites, *Pteromalus* (?) especially numerous one season (1885). From a lot of galls sent to me from Owen Sound I reared two specimens of the parasite *Torymus Brodei*, Ashm., which is a more or less common parasite of the White Oak leaf galls, *Acrespis pezomachoides*. Two seasons there emerged many specimens of a thrips; the function of these was probably inquiline. In cutting open some of the old galls, in one I found a curculionid beetle. The interior cell of the gall is ample, extending from the base to apex of tube, and in spring the larvæ and pupæ are enclosed in a fragile silken cocoon. The producer is a fine large Cecidomyid, one of the most beautiful of the group.

The geographical range is wide; I have received specimens from Oak Lake and Souris, Man., and from Tisdale, Sask.

## STUDIES IN THE CARABOIDEA AND LAMELLICORNIA.

BY THOS. L. CASEY, WASHINGTON, D. C.

The following studies have been in view on the part of the writer for some time, but no good opportunity to complete them offered itself until very lately, when Mr. Fuchs sent me a good assortment of the various forms of *Omus* from his collection. This material, together with my own, gives me a tolerably full and representative series from various localities upon which to base a new tabular statement, although, unfortunately, some of the described species are still unknown to me. Some isolated studies in *Cicindela* and a few Carabids and Lamellicorns, believed to be new, are made known in addition.

## CICINDELIDÆ.

*Amblychila*, Say.

The difference between the *cylindriformis* and *Baroni* types in this genus are almost subgeneric in nature. The following is apparently a subspecies of *Baroni*:

*A. longipes*, n. subsp.—Form elongate, flattened above, but feebly ventricose, deep black throughout, densely alutaceous or subopaque above, feebly so and more shining beneath; head nearly as in *Baroni*, the antennæ very long, three-fourths as long as the body; labrum bluntly and approximately bidentate medially; prothorax evidently wider than the head, as long as wide, obtrapezoidal, with feebly arcuate sides, more rounded anteriorly, the apex broadly, evenly and feebly arcuate; surface evenly convex, the median line finely striiform; elytra fully three-fourths longer than wide, barely a fourth wider than the prothorax, with fine scattered asperite punctures, serially arranged, the lateral carina fine and rather broken, extending nearly to apical third, with a similar carina parallel and a short distance above it, extending about as far posteriorly, also a few elongate carinules, forming a third short subbasal and disconnected line; legs long and slender, the hind tibia and tarsus subequal and together fully three-fourths as long as the body. Length (♂), 21.7 mm.; width, 7.3 mm. Arizona (Baboquivari Mts.), F. H. Snow.

Differs from *Baroni*, as evident from the photograph of the type published by Mr. Rivers (Zoe IV, 1893, p. 218), in its less inflated, more elongate and less shouldered hind body, with relatively smaller punctures and a well-developed second pleural carina at a short distance above the first, in the larger prothorax, with less arcuate anterior margin, and in its

apparently longer legs, the comparison being made from the male in each instance.

*Omus*, Esch.

In this genus it is impossible to say that any really serious work has ever been attempted, and time and material are still insufficient to bring the present study under any such purview. It may be expedient, however, to correct at this opportunity certain impressions, possibly derivable from the recent publications of Dr. W. Horn, of Berlin, who has left the subject in such a condition of uncertainty, that few apparently consider it worth while to give much attention to the taxonomy of the genus from any point of view. This author has placed practically all the Californian forms under a single specific heading, granting to none of them any higher status than the subspecies. The absurdity of this decision can best be demonstrated by means of the accompanying outlines (Fig. 7), drawn from

the protruded male generative organ of a number of species, which, as can be readily perceived, differ so much in several cases as in all probability to prohibit copulatory union of the sexes,—the best possible proof of specific isolation. These drawings are not in any case foreshortened, but are the

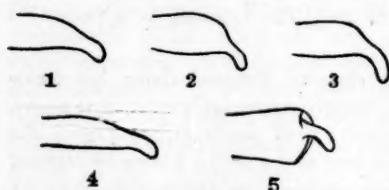


FIG. 7.—1, Copulatory spicule in *Omus Tularensis*; 2, same in *O. Dunnii*; 3, same in *O. parvicollis*; 4, same in *O. lugubris*; 5, same in *O. elongatus*.

accurately delineated outlines as seen in a direction truly perpendicular to the plane of the lateral face of the organ. In the case of *elongatus* the intromittent spicule is so aberrant that I carefully looked for some evidence of accidental deformation, but could find none; the substance of the spicule is densely chitinized, and, viewed under higher power, betrays no indication of injury; but the divergence from the usual conformation is so radical, in a species not notably aberrant otherwise, that I do not desire to maintain definitely that we may not be dealing here with a most remarkable deformity in the unique type of the species.

In regard to sculpture of the elytra, Dr. W. Horn states that it is without weight in distinguishing species, referring particularly to the extreme case of *punctifrons* and *confusus*; but, on the other hand, Dr. G. H. Horn states, in the remarks under his description of *LeContei*: "The elytral sculpture is remarkably uniform in all the specimens of *Omus* that

have passed through my hands, scarcely any variation occurring in many individuals of all the species examined.\* As far as I have been able to observe, in series of individuals known to have been collected together in one environment, there is comparatively little variability in sculpture, so that radical departures in this respect are virtually sure signs of specific or subspecific difference.

The genus *Omus* may be divided into three quasi-subgeneric groups of species, each distinguished by a remarkable peculiarity of habitus, as follows :

Pronotum without tactile setæ along the side margins.

Elytra with very large and conspicuous foveæ ; species stout and of large size. Northern coast regions ..... Group I (*Dejeani*)

Elytra with small and more or less inconspicuous foveæ ; species smaller, more abundant in the southern regions and disappearing through smaller and more depauperate forms to the northward.

Group II (*Californicus*)

Pronotum with numerous tactile setæ along each side margin ; body submetallic ; form rather slender and subcylindric ; foveæ inconspicuous.

Group III (*submetallicus*)

The *Dejeani* group, composed of *Dejeani* alone, is so well known that it needs no further attention here ; and the *submetallicus* group, also at present monotypic, is completely unknown outside of the Horn collection ; so my remarks are here limited to the *Californicus* group only. This group is remarkably plastic, and consequently rich in species and subspecies, as may be inferred from the following tabular statement :

Species of the coast regions .....	2
Species of the Sierras .....	9

\*So the doctors disagree, as in the trite old saying, and, in the dilemma thus created, the average collector knows not which horn to seize. My own opinion is that if Dr. W. Horn had exercised even slight acumen in dealing with his material, he would have seen that nearly all the erratic variation in sculpture that he announces is due to confusing and mingling together different taxonomic units ; call these units what he may, they are constant and fixed forms, which have developed in the numerous isolated valleys of the broken mountain regions of California, or at different elevations, and it serves no useful purpose to refuse to give them proper value, besides leading to needless complexity in nomenclature. There is nothing gained by holding that what are commonly known as subgenera or well-marked groups of species are the only real species, and then stringing out from each numerous impossible categories of subsidiary forms. If the binomial, and possibly even the trinomial, system is not to be lost in chaos, we must descend from such an unphilosophically exalted idea of species.

2—Elytra more gradually narrowed behind from only slightly behind the middle, the apex acutely ogival, their surface coarsely and very irregularly punctate, with the foveæ deep and evident. Northern regions ..... 3

Elytra more rapidly converging and rounded in about apical third, except in *LeContei*. Regions near San Francisco and to the southward ..... 4

3—Pronotum rapidly and deeply declivous laterally toward apex, so that the anterior angles are scarcely at all observable from a vertical viewpoint, the ruge obsolescent medially. Length, ♂, 12.5-13.5, ♀, 14.0-15.5 mm.; width, ♂, 4.7-5.0, ♀, 5.5-5.8 mm. Oregon and Washington State ..... *Audouini*, Rche.

Pronotum and general form of the body as in *Audouini*, except that the elytra are more elongate, more obtuse at apex, elliptical, less convex, similarly devoid of humeri in the male, and rather less irregularly, though very coarsely punctate; the head and labrum similar, except that the upper surface is coarsely and deeply rugose throughout, without smoother or punctate medial anterior region, the pronotum similar in form but deeply and conspicuously rugose throughout, almost as strongly as in *Californicus*; colour deep black. Length, ♂, 14.0 mm.; width, 5.1 mm. Probably Northern California.

*mimus*, n. sp.

Pronotum not rapidly declivous laterally, with the apical angles fully visible from above. Body deep black, more shining than in *Audouini*; head more strongly bi-impressed, feebly rugose, finely, sparsely punctate medially toward the epistoma, the labrum with a broadly trapezoidal projection and very few widely-spaced punctures, not broadly arcuate medially as in the two preceding; prothorax rather more transverse and relatively larger, moderately obtapezoidal, with feebly and subevenly arcuate sides, the side margins coming far from attaining the basal bead, the surface rugose, less obsoletely so medially than in *Audouini*; elytra three-fifths longer than wide, only about a third wider than the prothorax, with less evident humeri in the female, but nearly similar, though rather less irregular sculpture. Length, ♀, 14.8 mm.; width, 5.5 mm. Oregon ..... *borealis*, n. sp.

4—Pronotum strongly and deeply vermiculato-rugose throughout ..... 5

Pronotum feebly, though very evidently rugose, and likewise subequally so throughout; size generally larger, the form tending to greater elongation ..... 6

5—Body strongly convex, deep black, shining; head broadly bi-impressed anteriorly, coarsely rugose, more finely and feebly anteriorly, but not punctulate, the labrum with a rather narrow truncate median projection; pronotum not rapidly declivous laterally, the anterior angles distinct from above, the sides broadly rounded, more converging basally, the lateral margins attaining the basal bead, the surface strongly rugose throughout; elytra short, three-fifths longer than wide, oval, the humeri rather evident, though broadly rounded and subequally so in both sexes, the surface coarsely, closely and irregularly punctate, with the deep foveæ evident. Length, ♂, 13.0, ♀, 16.0 mm.; width, ♂, 5.3, ♀, 6.0 mm. Near San Francisco. Abundant. [♂ = *Hornianus*, W. Horn]..... *Californicus*, Esch.

A—Rather less convex, slightly larger and less ventricose, the elytra notably more elongate, deep black, almost as shining; head with the rugæ less coarse and much deeper throughout, the labrum broadly and evenly arcuate medially; prothorax relatively a little larger in the male and more nearly equal in relative size in the two sexes, the sides still more rapidly converging behind the middle in the male, the rugæ even deeper and similarly equal and dense throughout; elytra more elongate, the sculpture rather less coarse, less irregular and rather denser; male and female more nearly equal in size. Length, ♂, ♀, 14.5–16.0 mm.; width, 5.3–6.0 mm. Napa County..... *sculptilis*, Csy.

6—Elytra widest before the middle, gradually narrowing and with less arcuate sides thence to the apex, black, shining, the head sparsely rugose, smooth anteriorly; prothorax slightly wider than long, obtrapezoidal, the sides arcuate and gradually converging to the base, the surface feebly shining, intricately wrinkled, but not so strongly as in *Californicus*, the median line nearly obsolete, the anterior transverse impression very faint; elytra shining, with large punctures, each distinct and with feeble foveæ. Length, ♂, 17.0 mm. Vicinity of Monterey..... *LeContei*, G. H. Horn

Elytra regularly oval or, in the female, slightly shouldered, widest at about the middle..... 7

7—Pronotum almost plane medially, somewhat as in *sequoiarum*. Differs from *LeContei* in having the head anteriorly finely rugulose and the median stria of the pronotum almost obsolete; antennæ long and stout; hypomera broadly visible from above. Length, 16.0–18.5 mm. Probably from vicinity of Monterey; possibly a composite, the male

being one species and the female another from a different zoological region..... *Fuchsii*, W. Horn

Pronotum evidently convex throughout, the transverse anterior line and median stria both very distinct..... 8

8—Vermiculate rugulosity of the pronotum very coarse, broad and unusually feeble. Deep black, shining; head with very coarse though rather shallow rugæ, becoming smooth and punctureless only along the epistomal suture medially, the labrum broadly arcuate and uneven medially; antennæ moderate; prothorax slightly transverse, moderately narrowed at base, the sides notably arcuate, becoming parallel in about apical third; elytra evenly elongate-elliptical, without humeri ( $\delta$ ), the punctures rather small and notably sparse throughout. Length,  $\delta$ , 16.5 mm.; width, 5.8 mm. Near San Francisco, G. W. Dunn..... *elongatus*, Csy.

Vermiculate rugulosity of the pronotum fine, close and much deeper, but not so strong as in *Californicus*. Similarly deep black and shining, strongly convex and less elongate; head more finely wrinkled, but otherwise nearly similar; prothorax nearly similar in form, but very much more finely and relatively more strongly rugulose; elytra much shorter and with feeble humeri in the male, much more pronounced in the female, the punctures rather small and sparse, though deep, the foveæ small and sparse. Length,  $\delta$ ,  $\varphi$ , 15.5-16.0 mm.; width, 5.7-6.0 mm. Vicinity of San Francisco, G. W. Dunn. *Dunnii*, n. sp.

A—More elongate, but otherwise nearly similar, strongly convex; head similar, but with a more abruptly-defined and smoother medial area at apex, the labrum differing decidedly in having an abrupt truncate medial projection, which is feebler in the female; prothorax nearly similar; elytra similar in general form in both sexes, but notably more elongate and with the punctures much larger, deeper and more close-set, the foveæ evident. Length,  $\delta$ ,  $\varphi$ , 16.0-17.5 mm.; width, 5.6-6.25 mm. Monterey Co. (Carmel), Chas. Fuchs..... *regularis*, n. subsp.

B—Still narrower, relatively more elongate and less convex, also less shining, deep black; head nearly as in *regularis* and deeply bi-impressed anteriorly, more coarsely rugose, the anterior smooth area evident, the labrum similar, the eyes somewhat larger; prothorax similar; elytra subdepressed, similarly elongate but more

evenly elliptical ( $\delta$ ) and with barely a trace of humeri, the punctures much smaller and sparser, being more nearly as in *Dunni*. Length,  $\delta$ , 15.0 mm.; width, 5.1 mm. Monterey Co.

*maritimus*, n. subsp.

9—Form more elongate and generally more shining..... 10  
 Form stouter and usually duller in lustre, frequently opaculate..... 20

10—Elytra strongly convex; body rather large, usually notably slender, with the head and prothorax smaller as a rule. Species more southern in habitat..... 11

Elytra less convex, frequently somewhat depressed, the head and prothorax relatively larger. Species of the middle or more northern Sierras. 15

11—Elytra elliptical, widest in front of the middle, moderately convex, closely, not deeply punctate, confusedly so toward apex. Moderately stout, deep black and shining; head moderate, rugulose throughout, except at the middle of the front, where it is smooth and sparsely punctate, the anterior impressions feeble; labrum bisinuate, the median lobe arcuately advanced; antennæ moderate; prothorax with the sides moderately converging to the base, feebly arcuate, the surface rugulose throughout, but not deeply, the median stria very fine, the fine side margins attaining the base. Length, 17.0 mm. Mariposa Co. (Coulterville)..... *intermedius*, Leng

Elytra widest at the middle, convex..... 12

12—Elytral punctures small and widely separated..... 13  
 Elytral punctures larger, deeper, more rounded and narrowly though clearly separated..... 14

13—Form very elongate, the frontal parts of the head almost smooth but never distinctly punctate, the vertex with two not very widely separated, small smoother spots between the eyes, the spots not impressed. Form more parallel, black; head and elytra moderately shining, somewhat alutaceous, the pronotum subopaque; head feebly rugose almost throughout, the frontal impressions large, moderate in depth; labrum broadly arcuate medially, the antennæ long and somewhat slender; prothorax larger, two-thirds as wide as elytra ( $\delta$ ), wider than long, the sides strongly converging behind about apical third, parallel anteriorly, the surface finely but distinctly vermiculate throughout; elytra twice as long as wide, elliptic, without humeri ( $\delta$ ), the two series of foveæ distinct, the punctures strong, but small and widely separated. Length,  $\delta$ , 17.5 mm.; width, 6.0 mm. Tulare Co. Without more accurate indication of locality..... *procerus*, n. sp.

A—Form less parallel, the head and prothorax relatively very much smaller in both sexes, the latter but little more than half as wide as the elytra; other characters nearly as in *procerus*, except that the prothorax is not wider than long (♂), or but slightly so (♀), and with the rugosity still feebler, sometimes almost obliterated; elytral punctures still finer, very small and decidedly sparse, the foveæ smaller and less evident, the humeri wanting (♂) or feebly evident (♀). Length, ♂, 15.5-17.5, ♀, 18.0-20.0 mm.; width, ♂, 5.6-6.4, ♀, 6.7-7.0 mm. Tulare Co. (Redwood and Mabel Creeks and Watson Springs). The largest female is less shining than the other examples, in fact almost opaque, and has the head and prothorax relatively somewhat larger, with the sides of the latter rather more rounding basally and with its surface more finely and evidently rugulose . . . . . *parvicollis*, n. subsp.

Form less elongate, deep black, slightly alutaceous, the head rugose, feebly, obliquely bi-impressed anteriorly, with the median apical surface not smooth, but evidently though finely and confusedly to transversely rugulose, the vertex between the eyes with two small and rounded, smoother and usually well impressed spots. Labrum broadly arcuate medially; antennæ less elongate; prothorax wider than long, decidedly transverse in the female, strongly obtrapezoidal, the converging sides becoming nearly straight basally, more rounded anteriorly, the surface finely but evidently rugose throughout; elytra moderately elongate, convex, barely at all shouldered (♂), or very evidently so (♀), the punctures rather small but deep, and widely separated, their bottoms briefly sublineiform. Length, ♂, 16.0-17.0, ♀, 17.5-19.5 mm.; width, ♂, 5.8 mm., ♀, 6.6-7.0 mm. Calaveras Co. (Mokalumne Hill), F. E. Blaisdell . . . . . *Blaisdelli*, n. sp.

14—Form nearly as in *Blaisdelli*, deep black, rather shining, more so beneath as usual; head rugose, finely and feebly so in the middle anteriorly, the two spots of the vertex larger, not impressed and with coarser, more vorticiform rugæ; labrum very broadly arcuate medially, the antennæ moderate; prothorax obtrapezoidal, wider than long, the converging sides slightly more arcuate basally, strongly rounding anteriorly, the surface evidently though not strongly vermiculato-rugose throughout, the transverse impressions and median stria distinct; elytra moderately elongate, convex, feebly shouldered (♂), or rather evidently so (♀), the punctures coarse,

deep, more rounded, isolated though not so sparse as in the preceding forms. Length, ♂, ♀, 17.0-19.5 mm.; width, 6.1-7.3 mm. El Dorado Co. (Placerville) ..... *cibripennis*, n. sp.

15—Larger species, the front nearly smooth medially at apex; prothorax unusually narrowly rounded and prominent at the sides at apex, and more rapidly narrowed thence to the base than in any other species except *Dejeani*, the sides straight, the reflexed lateral margin more prominent near the base than elsewhere, owing to the greater lateral depression of the surface at this point ..... 16

Small species, the front always finely but distinctly punctured in the middle anteriorly; prothorax more normal in form, less narrowed basally, the sides more broadly rounded anteriorly, the reflexed margin not more prominent near the base; elytra only feebly convex ..... 17

16—Elytra shorter, about one-half longer than wide, broadly and more evenly convex, shining black, the elytra deep piceous-black; head with two long oblique anterior impressions, very feebly rugulose, smooth anteriorly, the labrum broadly, evenly arcuate medially and not much produced; antennæ moderately stout; prothorax with the apical width scarcely exceeding the length (♂), the surface shining, the rugulosity fine and feeble, the transverse impressions and median stria strong; elytra distinctly shouldered, finely and sparsely punctate, the foveæ very few and subobsolete. Length, ♂, 16.0 mm.; width 6.1 mm. Placer Co. (Lake Tahoe, apparently confined to that locality) ..... *Edwardsi*, Cr.

A—Nearly similar, shining, black, the elytra not obviously piceous, the rugulosity of the head and pronotum much stronger, the labrum strongly produced in the middle in a somewhat narrowly and abruptly truncate trapezoidal median lobe; elytra strongly shouldered (♀), the punctures similarly small and sparse but more impressed, the foveæ larger, more distinct and more numerous but still few in number and only moderately evident. Length, ♀, 18.0 mm.; width, 6.5 mm. Placer Co. ..... *lobatus*, n. subsp.

Elytra decidedly more elongate, relatively narrower, more than one-half longer than wide and distinctly flattened. Body deep black throughout, the elytra not paler, shining; labrum throughout as in *lobatus*, strongly produced and trapezoidal medially; head obliquely impressed anteriorly, smooth between the impressions, elsewhere

distinctly rugose; prothorax with the apical width decidedly greater than the median length, finely, densely rugulose and somewhat alutaceous or dullish; elytra evidently shouldered, subequally so in the sexes, much narrower in the male, the punctures deeply impressed, moderately small, partially sublineiform, well separated discally, larger and densely crowded laterally and apically. Length, ♂, ♀, 16.5-17.0 mm.; width, 6.1-6.7 mm. Placer Co.

*montanus*, Csy.

A—Almost as in *montanus* but still more slender in the male, and stouter, with relatively larger prothorax in the female, shining and deep black throughout; prothorax similar in form but very highly polished, the rugulosity not so dense though almost as evident throughout; elytra similar in general form, but with the punctures very small and sparse suturally, becoming much larger but still well separated laterally, partially confused apically. Length, ♂, ♀, 14.7-17.5 mm.; width, 5.7-6.8 mm. Placer Co.

*lucidicollis*, n. subsp.

B—Body rather more abbreviated, the prothorax notably shorter, shining, dark piceous throughout; prothorax sculptured as in the preceding but not quite so lustrous, though more so than in *montanus*; elytra (♀) as narrow as in the male of *montanus*, similarly shouldered, the punctures much larger than in either of the preceding, more rounded, deeply impressed, less widely separated suturally, becoming coarse, deep and crowded laterally and apically. Length, ♀, 16.0 mm.; width, 5.9 mm. Placer Co.

*brunnescens*, n. subsp.

17—Labrum trapezoidal and rather strongly advanced medially, with the apex truncate..... 18

Labrum very broadly and evenly arcuate and but very slightly advanced medially..... 19

18—Form rather slender (♀), black, moderately shining; head with two small shallow impressions anteriorly, in great part feebly rugose; antennae moderate; prothorax slightly wider than long, the sides very feebly arcuate, becoming rounded and parallel in apical third, the surface rather strongly but not very closely vermiculato-rugose, the median stria very fine and feeble; elytra three-fifths longer than wide, scarcely at all shouldered, gradually ogivally pointed behind, the punctures coarse but well separated suturally, becoming scarcely so large but deeper and very close-set laterally, each puncture with a

pronounced asperity at its anterior margin, the interspaces with a few very fine and extremely feeble scattered punctules. Length, ♀, 14.5 mm.; width, 5.4 mm. Levette cabinet,—probably from the middle Sierras..... *punctifrons*, Csy.

A—Similar, except that the male is fully as stout as the female of *punctifrons*, and the labrum, instead of having the usual close-set series of setiferous punctures, is smooth, polished and with only four apical punctures, omitting those at the angles; prothorax similar; elytra more shouldered, much more rounded and obtuse at apex and with the punctures smaller, much closer and irregularly subconfluent throughout, the foveæ similarly larger than usual but very few in number and not conspicuous. Length, ♂, 14.0 mm.; width, 5.3 mm. Sierra Co..... *degener*, n. subsp.

Form (♀) slightly stouter than in *punctifrons*, the head nearly similar, but with the rüge and anterior punctures finer; prothorax relatively larger, more finely rugulose and rounding and parallel at the sides in apical two-fifths; elytra more broadly oval, similarly acute at tip but more shouldered at base, the margins more strongly reflexed, and the punctures smaller and densely confluent throughout. Length, ♀, 14.2 mm.; width, 5.6 mm. Origin as in *punctifrons*.. *confusa*, Csy.

19—Body (♂) decidedly slender but with relatively rather large prothorax, deep black, alutaceous, the elytra shining; head very finely wrinkled, the anterior impressions large but shallow; prothorax distinctly wider than long, much wider than the head, of the usual form in this group, densely and rather strongly rugulose throughout, the transverse impressions and median stria feeble; elytra scarcely more than one-half longer than wide, feebly shouldered, gradually obtusely parabolic apically, the punctures coarse, irregular, rather evidently separated, the interstices shining with faint alutaceous lustre. Length, ♂, 14.0 mm.; width, 5.1 mm. Placer Co.. *fraterculus*, n. sp.

20—Pronotum finely and generally closely but obviously wrinkled throughout; head rugose, obliquely bi-impressed anteriorly, with the intermediate surface smoother and more or less distinctly, finely punctate, as in the preceding group..... 21

Pronotum smooth centrally, the vermiculate sculpture wholly obsolete .. 22

21—Elytral punctures moderate, rather close-set. Body deep black, dull in lustre, the elytra more shining; head rugose; labrum strongly advanced medially; antennæ moderately stout; prothorax wider than long, only moderately narrowed posteriorly, with the sides more or

less arcuate or more rapidly rounding inwardly at the base, becoming rounded and parallel anteriorly, the side margins sometimes not quite attaining the base, the impressions feeble, the median stria fine; elytra oblong-oval, widest at the middle, moderately convex, the suturea seldom distinct; male and female not differing much. Length, ♂, ♀, 15.0-17.0 mm.; width, 6.0-6.4 mm. Calaveras Co., near the "Big Trees" ..... *sequoiarum*, Cr.

A—Nearly as in *sequoiarum*, except that the prothorax is relatively larger and rather more narrowed from near the apex to the base, with straighter sides, which however curve similarly inward at base; elytra differing decidedly, being blackish-piceous, more shouldered at base, widest before the middle, the sides thence gradually converging and broadly arcuate to the more ogival apex, the punctures somewhat coarser. Length, ♂, 16.5 mm.; width, 6.4 mm. Levette cabinet. Probably from the vicinity of Calaveras Co. *lugubris*, Csy.

22—Elytral punctures coarse, deep and very conspicuous; sides of the prothorax moderately converging and nearly straight behind apical third, thence strongly and conspicuously rounding to the base, the disc evidently rugose near apex and base throughout the width, smooth medially ..... 23

Elytral punctures very shallow and much less conspicuous; sides of the prothorax similarly converging and nearly straight, but much less rounding inwardly at base, the disc nearly smooth apically as well as medially, but rugulose along the base ..... 24

Elytral punctures wholly obsolete, the surface perfectly smooth; prothorax as in the preceding, but smooth throughout, except toward the sides along the base, the labrum more prominent medially than in either of the preceding groups ..... 25

23—Body very dull and densely alutaceous throughout above, shining beneath, deep black; head evidently rugulose, smoother but scarcely punctate anteriorly, the labrum arcuately prominent medially; antennae short and rather stout; prothorax much wider than long, with the sides as converging as in *Tularensis*, three-fourths as wide as the elytra (♀), the base broadly bisinuate; elytra widest at the middle, slightly more than one-half longer than wide, oblong-oval, rather convex, somewhat shouldered at base, rapidly, acutely ogival at apex, the surface strongly micro-reticulate, the punctures sub-contiguous, deeper, better defined and somewhat confused laterally

and apically, the foveæ inconspicuous. Length, ♀, 15.5 mm.; width, 6.2 mm. Mariposa Co. (Wawona).....*collaris*, n. sp.

Body smaller, shorter, more ventricose, similarly deep black and notably convex but with relatively smaller head and prothorax, the two latter densely dull, the elytra notably shining; head very obsoletely rugulose, smooth anteriorly, the labrum more unevenly prominent medially, where there is a small feeble sinus; prothorax distinctly wider than long, the base four-fifths as wide as the apex, barely two-thirds as wide as the elytra, the latter very short, scarcely one-half longer than wide, widest somewhat behind the middle, very obtuse apically, narrowly shouldered basally, the punctures still larger, notably deeper, more separated and better defined, each similarly with a small anterior asperity. Length, ♂, 14.5 mm.; width, 6.0 mm. Mariposa Co (Wawona) .....*compositus*, n. sp.

Body robust, dull black, with a slight silky lustre; head with a few indistinct rugæ between the eyes; prothorax but little wider than long, subquadrate, less narrowed behind than in any other species and less convex, the hind angles rounded; disc slightly rugose at base and tip, the transverse impressions distinct but not deep, the dorsal line fine; elytra rather broadly ovate, wider than the prothorax, much rounded on the sides, deeply punctured, with a few larger but not conspicuous punctures intermingled; legs rather slender, about as in *Audouini*. Length, 16.5 mm. Yosemite Valley. A single female specimen—apparently still unique.....*Horni*, Lec.

24—Form very stout, convex, unusually ventricose, deep black, alutaceous; head almost smooth, with two small feeble impressions between the eyes, generally confluent with the oblique shallow frontal impressions, the labrum broadly, unevenly arcuate medially though somewhat advanced beyond the angles, the sinuses small and rather feeble; antennæ stout; prothorax large, wider than long, though but little so in the male, the sides moderately converging and broadly, very feebly arcuate, the base three-fourths as wide as the apex; elytra much more inflated in the female than in the male, somewhat shouldered basally and rapidly obtusely ogival apically in both, widest at the middle, the surface sericeous, the foveæ generally very evident. Length, ♂, ♀, 15.0-17.5 mm.; width, 5.9-7.0 mm. Tulare Co. (Davenport, 6,400 feet; Soldiers' Camp, 5,800 feet, and Colony Mill, 5,415 feet).

*Tularensis*, n. sp.

A—Nearly as in the preceding, but more slender in form in the male, with the antennæ evidently less stout, the labrum more nearly truncate, the prothorax rectilinearly truncate at base, and not broadly and feebly bisinuate as in *Tularensis*, the elytra less shouldered at base, with the punctures smaller, still feebler and less close-set. Length, ♂, 14.8 mm.; width, 5.4 mm. A single specimen marked simply "Tulare Co" ..... *gracilior*, n. subsp.

25—Body in the female stout, though more elongate and not so briefly ventricose as in the same sex of *Tularensis*, alutaceous, deep black; head smooth, the anterior impressions rounded, distinct, the labrum strongly produced in the middle in a trapezoidal lobe; antennæ moderate; prothorax formed as in *Tularensis*, the anterior impression deep and obliquely sulciform laterally, the portion between the broadly bisinuate base and the subbasal line perfectly smooth in the middle; elytra more elongate, more parallel, much more shouldered at base, more gradually and acutely ogival with less arcuate sides posteriorly, having scarcely a trace of punctuation but with some fine and feeble sparse creases, the foveæ very small, sparse, asperulate. Length, ♀, 18.5 mm.; width, 6.9 mm. Tulare Co. (Mineral King Road, 8,000 feet) ..... *levis*, G. H. Horn

I have seen no representative of *Xanti*, Lec.; *ambiguus*, Schpp., or *Van Dykei*, W. Horn, and so have not included them in the table; the first, from the regions back of Sta. Barbara, is said by W. Horn to be identical with *Californicus*, but this identification is somewhat involved in doubt. *Ambiguus* is said to come in the neighbourhood of *Audouini*. I have seen the type of *Horni*, Lec., but have no example; it seems certainly to be a distinct species, because of its very large prothorax, with very feebly converging sides; it is allied more closely to *Tularensis* than to *sequoiarum*. The form published by Dr. W. Horn under the name *Van Dykei* (Deutsch Ent. Zeit., 1903, p. 197) is distinct in having the elytra about as wide as the prothorax, and the pronotum finely and evenly rugose throughout; it is said to belong near *Audouini*.

The *punctifrons* group is in some respects a Sierran representative of the northern coast *Audouini* group, but there are numerous rather radical points of divergence, the most noticeable being the peculiar form of the pronotum in *Audouini*, with its deeply declivous sides, though in *borealis* this character is lacking; but this species differs greatly from either *Audouini* or *punctifrons* in its very large oblique frontal impressions,

among other features. The most obvious points of resemblance are the more acutely attenuate elytra, with coarse and irregular sculpture, and the presence of punctures on the anterior part of the front; but these punctures are also very noticeable in other types, such as *sequoiarum*. The close association of the *Audouini* and *punctifrons* groups suggested by W. Horn is therefore by no means warranted.

It might be contended that *collaris* and *compositus* of the table are the sexes of a single species, but the incongruities of the types are of a distinctly different kind from those distinguishing the sexes in any other form, and, if they should prove to belong to a single species, it will be decidedly noteworthy. It is true they come from the same locality, but the various labels which they bear would seem to show that they inhabit different stations in the vicinity of Wawona, and were probably not taken by the same collector. In my original description of *lugubris* two subspecies were included, and I here definitely adopt as the type the example alluded to as having the elytra more gradually attenuated and widest before the middle. The other specimen, although very close to typical *sequoiarum*, differs in its more elongate form, relatively smaller prothorax, and some other slight characters not determinative without further material. Still another subspecific form, represented by a single specimen, has the elytral punctures much smaller and feebler than in any other.

I notice that the name *levis* of G. H. Horn is persistently misspelled "levis" by Dr. W. Horn.\*

*Cicindela*, Linn.

The peculiar vestiture of the legs in *Dromochorus*, it seems to me, is a perfectly valid character distinguishing that genus from *Cicindela*, apart from the difference in general habitus; for, even in those forms of *Cicindela* having vestigial wings, such as *celeripes*, there is no tendency toward fine decumbent crural pubescence. The sculpture of the elytra is still more minute than anything that I have observed in *Cicindela*. This sculpture is wonderfully beautiful under the moderately high power of a binocular. In *C. nigrocaerulea* and allied forms, for example, the ground sculpture consists of minute crowded, nearly circular pits, which, more posteriorly,

\*It is true that *levis*, with the *e* long, means smooth in the purest Latin, but, with simply a short pronunciation of the *e*, which is never indicated in ordinary print, it also signifies *light in weight*. To distinguish these two very distinct meanings, the word smooth is usually written *levis*, the *æ* being a legitimate rendering of the long *e*, and very important to observe in naming species in order to avoid ambiguity.

become less regularly concave, and, apically, assume the form of closely crowded convexities, somewhat like the facets of a compound eye.

The form known in our cabinets as *Santaclaræ*, Bates, is a species distinct from *vulturina*. In the latter the hind body is shorter and more depressed, and the median band is very narrow, extending from the margin obliquely forward, then broken posteriorly at a right angle, extending to about apical third and inner fourth, not enlarging much. In *Santaclaræ* there is a rounded spot just before and another just behind the middle, the latter nearer inner third, the two spots joined by a very fine oblique line; it occurs with the ground colour pure green, olivaceous, bright coppery brown or smoky black. *Obsoleta* (= *prasina*) is much more elongate, and is always spotless; it is also a distinct species.

Under the *longilabris* group, Mr. Leng states that *perviridis* has the elytra more elongate and convex. The three specimens in my collection, from Placer Co., California, have the elytra narrower and relatively more elongate, though not by any means more convex, but rather more depressed, than in *longilabris*; their sculpture is notably denser and less coarse; one of them is of a decided blue green. A green California *longilabris* is similar to the normal Colorado form in sculpture, but is of a much brighter and purer green than my representatives of *perviridis*, which may therefore not be entirely typical. My single example of *montana*, Lec., is slightly smaller, shorter and stouter than the typical *longilabris*, the prothorax notably shorter, the median mark of the elytra finer and shorter, bent at right angles and the sculpture normal; it is from Alberta. I regard *montana* as, at any rate, a very well-marked subspecies of *longilabris*, if not distinct. The following is another subspecies generally confounded with *montana*:

*C. Nebraskana*, n. subsp.—Form very much more slender than in *longilabris*, and still more so than in *montana*, deep black throughout above and beneath; labrum similar though rather shorter, deep black throughout in the female; third antennal joint with rather stiffer external spines; head similarly concave; prothorax similar but relatively smaller, scarcely as wide as the head; elytra narrower, nearly three-fourths longer than wide, almost similarly sculptured but with the surface between the coarse and well-separated punctures much more shining, without trace of pale marking of any sort. Length, ♀, 13.0 mm.; width, 4.9 mm. Nebraska.

In the *nigrocærulea* group there are many forms, some specific and others sub-specific or racial; thus far only a few of them have been

described, such as the original LeContean species, and, more lately, *robusta* and *Bowditchi* by Leng. The following is a mountain modification of *nigrocærulea* :

*C. seminalis*, n. subsp.—Very deep purplish-blue, pervaded with large clouds of bluish-black, sericeous, brighter violet-blue and polished beneath, with sparse white hairs at the sides of the body and on the legs; head finely strigilate between the eyes, impunctate and nude anteriorly, the labrum finely tridenticulate, with the median tooth more prominent, pale, infumate basally and apically; labial palpi very pale ( $\delta$ ) or dark piceous ( $\varphi$ ), the apical joint black; prothorax a fourth wider than long, about as wide as the head, margined laterally with a few decumbent white hairs; elytra ( $\delta$ ) impressed longitudinally near the suture and with an entire row of foveæ, also a short line of the latter in the intrahumeral impression, the punctures feeble but evident, less marked apically. Length,  $\delta$ ,  $\varphi$ , 10.5–11.8 mm.; width, 4.2–4.8 mm. Colorado (Las Animas).

In the female the elytra are much more inflated than in the male, and their surface, instead of being uniform in its sericeous lustre throughout, as in that sex, has each a small oblique impression near the suture rather before basal third, which impression is polished and densely, deeply and very distinctly punctate; the longitudinal impression and the foveæ also are almost obsolete. This subspecies is smaller than *nigrocærulea*—12.5–14.25 mm.—and, although similar in having only a small transverse white streak at the elytral apices, apparently has the prothorax more transverse.

The following three are also modifications of *nigrocærulea*, but are more closely allied to the *robusta* type. They are all of a sericeous-green colour above, more shining deep blue beneath, with more or less green legs. They may be defined as follows,—from the male in each case:

*C. Snowi*, n. sp.—Rather slender, moderately convex, the general structural characters and setæ as in *nigrocærulea*; head much more coarsely strigose toward the eyes than in any other allied form; prothorax feebly obtrapezoidal, with nearly straight sides, evidently narrower than the head, and but slightly wider than long, with two close-set and rather regular series of coarse punctures near each side margin; elytra one-half longer than wide, with the usual line of foveæ but without the subsutural impression, the punctures strong, relatively rather coarse, blue in colour and somewhat lucidogranuliferous, becoming simple and subobsolete apically; each elytron has a pale spot on the humerus, another externally

at basal third, and one at the middle, a small spot at inner and just before apical third, and an entire but slender apical lunule. Length, ♂, 11.0 mm.; width, 4.2 mm. Arizona (Congress Junction).

*C. triplicans*, n. subsp.—Similar to *Snowi* but more elongate, with the anterior parts stouter, the head very minutely and closely strigilate between the eyes; prothorax larger, about as wide as the head, more transverse and more strongly obtrapezoidal, the punctures laterally confused, though with a single regular series near the margin; elytra more elongate, two-thirds longer than wide, with foveæ, punctures and minute granulation as in the allied forms, the punctures smaller and closer than in *Snowi*, feebler and simple, though distinct throughout each elytron, with a pale spot on the humerus, another submarginal and smaller at the middle and at the posterior arcuation, and a slender transverse spot at the apex. Length, ♂, 11.4 mm.; width, 4.2 mm. Colorado (Robinson).

*C. velutoidea*, n. subsp.—Rather more olivaceous-green, smoother and more depressed above than in either of the preceding; head nearly as in *triplicans*, but with the left mandible more abruptly bent and with its external curve much more narrowly rounded; prothorax nearly similar and almost as wide as the head; elytra shorter and relatively broader, one-half longer than wide, the punctures very small, feeble and much sparser, wholly obsolescent apically, each elytron more evidently impressed along the line of foveæ and with a white spot on the humerus, one at outer fourth at the middle and at inner third rather before apical third, and a complete apical lunule. Length, ♂, 10.5 mm.; width, 4.25 mm. A single example from an unrecorded locality, but probably from Colorado.

In the *sexguttata* group *patruela* is well distinguished as a species by its very dense sculpture, duller, more olivaceous-green colour and complete median band of the elytra among other characters. *Sexguttata* is of a more bluish-green and has the elytral punctures smaller and well spaced; my examples are from North Carolina to northern New York and Indiana; confused with this, but constituting a distinct species, is the following:

*C. Levettei*, n. sp.—General form and structure as in *sexguttata*, the maculation of the elytra similar, except that the inner post-median spot is generally subobsolete, but with the coloration of a brighter and purer green, the elytral punctures stronger and more close-set; distinguished principally, however, by the notably longer legs in both sexes. Length, ♂, ♀, 12.0-14.0 mm.; width, 4.8-5.6 mm. Iowa.

*C. tridens*, n. subsp.—Similar to *Levettei*, except that the elytra are more elongated and more parallel (♂) or shorter and more parallel (♀), and are either wholly immaculate or with a very small submarginal spot at the middle and a small transverse apical remnant of the larger apical spot of *Levettei*; the strigilation of the interocular part of the head is also very evidently coarser. Length, ♂, ♀, 12.8 mm.; width, 5.0–5.2 mm. Northwestern Louisiana (Vowell's Mill), to Kansas (Onaga).

The labrum in this group is very strongly tridentate, the median tooth especially prolonged and acute.

The following form would seem to be allied to *punctulata*, but it differs in so many directions as to leave its exact affinity obscure for the time being :

*C. Boulderensis*, n. sp.—Form somewhat as in *punctulata* but much more elongate, convex, rather dull, dark coppery-brown, slightly more cupreous anteriorly, shining, green-blue and laterally densely pubescent beneath throughout the length; head granulose, strigilate laterally, the front bald, the labrum with the narrow apical truncature minutely unidentate; prothorax but little wider than long, moderately narrowed basally, broadly rounded at the sides, the marginal line strong; surface convex, finely, strongly rugulose, punctate and sparsely pubescent laterally, the impressions moderate; elytra elongate, parallel, not obtuse at tip, the sutural angles denticulate; surface strongly, rather finely and nitidoasperately punctate, the humeral lunule represented by the basal part and a post-humeral dot, the side margin, from just before the middle to apical third, unevenly and narrowly pale, the apical lunule complete but slender; there is also a discal dot at inner and apical third. Length, ♀, 12.0 mm.; width, 4.0 mm. Colorado (Boulder Co.).

This species differs from *punctulata* in having the line of foveæ parallel to the suture very small in size and almost obsolete, and in the densely and very conspicuously pubescent sides of the abdomen.

The form which I described (Ann. N. Y. Acad., IX, p. 296) as a variety of *purpurea*, under the name *plutonica*, is in reality a distinct species, not very closely allied to *purpurea*, or, in my opinion, to any other species. Recognizing its distinctness from *purpurea*, Dr. W. Horn states that it may be a variety of *tranquebarica*: at any rate, according to that author, it must be a variety of something. The Oregon specimens referred to *plutonica* by Leng seem to have been correctly determined.

*Denverensis* is not a subspecies of *purpurea*, but an abundantly distinct species, having the labial palpi basally pale, and not wholly black.

The Utah species, *C. echo*, Csy., occurs also at Amedee, Cal., in a form differing only in its larger size, stouter build and evidently larger head; this form can, however, be recognized as differing from the Utah types and may be named *Amadeensis* (n. subsp.). Length, ♀, 12.5 mm.; width, 5.2 mm. *Pseudosenilis*, W. Horn, is a very evident subspecies, occurring in Inyo Co., Cal. *Echo* is an isolated species, and not a subspecies of *Willistoni* as stated by W. Horn, differing in its minute labral tooth, sculpture and form of the maculation, among other features. *Depressula* is also an evidently valid species, and not a subspecies of *Oregona* as intimated by W. Horn.

The following is a subspecies of *depressula*:

*C. scapularis*, n. subsp.—Form stouter than in *depressula* and even more strongly depressed, almost similar in coloration, though rather darker and more obscure in the type, similar in sculpture and in its bald strigilate front, but with the elytral punctures still coarser, deeper, denser and more strongly nitidoasperate; labrum (♂) differing noticeably from that of the male of *depressula*, being piceous and not straw-yellow, and with the apex medially, not evenly arcuate with a minute, prominent median tooth, but approximately and feebly bilobed, the lobes separated by a small acute tooth that does not project beyond them; basal joint of the antennæ rather more inflated; prothorax larger, fully as wide as the head, two-fifths wider than long, obtrapezoidal, with the sides perfectly straight throughout; elytra with a well-developed pale spot on the humerus, the others nearly as in *depressula*, except that the apical is larger and more prolonged; under surface not green as in *depressula*, but deep violaceous-blue, hairy toward the sides. Length, ♂, 13.5 mm.; width, 5.3 mm. California.

This subspecies is very well differentiated and may prove to have higher taxonomic value; it somewhat resembles *Sierra*, Leng, in form and outline, but lacks any trace of the frontal punctures and pubescence of that species.

A form of *senilis*, differing in sculpture, form of the humeral lunule and other characters, is the following:

*C. exoleta*, n. subsp.—Moderately stout and convex, shining, the elytra duller, cupreous, with blue spots and transverse impressions anteriorly, the elytral punctures blue, the lateral border greenish; under surface blue-green; head nearly as in *senilis*, the labrum similarly with large discal punctures; prothorax obtrapezoidal, with straighter sides, the

surface more coarsely micro-rugulose, and the marginal raised border better marked; elytra with the humeral lunule not entire and of equal width throughout as in *senilis*, but widely divided, the posterior part more inflated; median band similarly ascending to the median line, more dilated inwardly and posteriorly, with its external part tapering to a narrow point of origin at some distance from the sides, and not more or less expanded along the latter as it is in *senilis*; apical lunule divided; under surface densely pubescent laterally throughout. Length, ♀, 12.5 mm.; width, 5.0 mm. California (Oakland).

In *senilis* the colour is obscure and blackish, with the sculpture of the pronotum extremely fine and dense and more vermiculate. My specimen of *senilis* I know to be authentic, but it is simply labeled "California."

A species which I cannot place very accurately at present may be defined as follows; it resembles *lunalonga* somewhat in general marking, but has the front densely pubescent:

*C. diffracta*, n. sp.—Rather narrow and convex in form, somewhat shining, the elytra duller; coloration as in the preceding, but brighter and with the elytra not margined with paler tint; under surface blue-green, with large cupréous areas anteriorly, the sides of the prosternum with very long dense white hair, the sides thence to the apex with fine and sparser decumbent hair; head finely strigilate, the front with long, dense, coarse, pale hairs, the labrum minutely, equally tridentate; prothorax narrower than the head, wider than long, obtapezoidal, well impressed, scarcely pubescent laterally; elytra parallel, broadly rounded behind, finely, not closely, subequally and nitidousbasperately punctate throughout, without a line of foveæ, the humeral lunule extending to the middle of the length at inner two-fifths, subequal throughout, but irregularly disintegrated, the median band transverse, approaching the humeral lunule very closely, then bent posteriorly, for an equal distance, finely disintegrated throughout, the apical lunule large, entire, not disintegrated. Length, ♂, 11.0 mm.; width, 4.15 mm. New Mexico (Las Vegas).

In *lunalonga* and others with which this may be supposed to be allied, the front is bald.

The following species was distributed extensively by Prof. Snow and others under the name *pimeriana*, Lec. It evidently cannot be in any way closely related to that species, however, but in the system of Mr. Leng

would seem to approach the Group H, defined by him (Tr. Am. Ent. Soc., 1902, p. 116) :

*C. Cochisensis*, n. sp.—Moderately slender, rather convex, strongly shining, bluish-green to wholly or in part deep cobalt-blue throughout; head not very finely strigilate, the frontal swelling closely punctate and with stiff erect white setæ; labrum pale, with the apical and basal margins narrowly piceous, the apex approximately bilobed, with a short and broadly angulate median tooth not projecting beyond them (♂), or more evenly arcuate, with a more prominent median tooth (♀); prothorax a little narrower than the head and slightly wider than long, narrowed basally, the sides broadly rounded; surface convex, deeply impressed, polished and only feebly wrinkled, with a very few coarse white lateral hairs, the sides margined; elytra parallel, more than one-half longer than wide, wholly immaculate, with rather strong and well-separated simple punctures, which are only slightly smaller apically; under surface with numerous long coarse white erect hairs laterally on the propleura, much shorter, white, and subdecumbent but numerous along the sides of the abdomen; anterior tarsi (♂) very narrowly dilated; hind tarsi but little longer than the tibiae. Length, ♂, ♀, 10.7-11.8 mm.; width, 4.0-4.7 mm. Arizona (Douglas).

I am unable to identify this with any Mexican species, and assume that it is quite local in the southern part of Cochise Co., Arizona.

The three following very small forms were collected by Mr. C. H. T. Townsend at Colonia Garcia, Sierra Madre Mts., Mexico, and have a common type of organization, with feeble and subobsolete sculpture; they are wholly glabrous throughout on the under surface:

*C. filitarsis*, n. sp.—Slender, moderately convex, alutaceous, dark greenish-blue above, more violaceous beneath; head almost even, finely strigose except along the middle, the front bald, the slope smooth; labrum sinuously oblique at each side of the frontal margin, the median advanced part obtusely trilobed and but little more than half the total width; prothorax small, slightly narrowed basally, rounded on the sides and distinctly wider than long, the marginal line indistinct, the surface convex, very finely, feebly sculptured, the anterior impression very feeble; elytra parallel, not very obtuse at apex, the sutural angles not modified, the surface wholly immaculate, finely, not very densely, subevenly but very feebly punctate; tarsi long and very slender. Length, ♂, 8.5 mm.; width, 3.1 mm. Mexico (Chihuahua).

*C. tumidifrons*, n. subsp.—Similar in general to the preceding but more shining, green above, blue and green beneath; head more broadly granulose along the middle, the front transversely and abruptly elevated above the vertex, with the median part of the anterior slope smooth and minutely, sparsely punctulate; labrum similar, except that the feebly trilobed advanced part is fully two-thirds the total width; prothorax much less transverse and with less rounded sides, only just visibly wider than long, the lateral marginal line much more evident and the anterior transverse impression deeper; elytra and tarsi nearly similar throughout. Length, ♂, 9.5 mm.; width, 3.6 mm. Mexico (Chihuahua).

*C. aterrima*, n. sp.—General organization as in the two preceding but much more elongate, alutaceous, deep black above and beneath, the latter shining; legs deep black, not at all metallic; head finely strigilate almost throughout, subeven, the front feebly swollen as usual, bald; labrum as in *filitaris*, but with the median trilobed projection a little wider; prothorax wider than long, obtrapezoidal, with nearly straight sides, having a very few short hairs laterally, the marginal line subobsolete, the impressions rather feeble; elytra parallel, similar but much more elongate, immaculate and with the punctures almost obsolete; tarsi not quite so slender. Length, ♂, 10.0 mm.; width, 3.75 mm. Mexico (Chihuahua).

Although *aterrima* is of the same general type as the two preceding forms, it would be a rather remarkable and very instructive fact if its status should prove to be anything less than specific.

#### CARABIDÆ.

##### *Omophron*, Latr.

The following are a few species and subspecies which have been undescribed in my cabinet for some years:

*O. grossum*, n. sp.—Body very large and stout, moderately convex and shining; head throughout and mandibles pale, the latter black apically, the clypeal suture finely infumate, a small transverse piceous cloud on the vertex basally; surface wholly impunctate, except a few punctures scattered along the base; antennæ slender; prothorax but slightly more than twice as wide as long, the sides more parallel than usual and very discontinuous with those of the elytra, gradually rounding and feebly converging anteriorly, the surface with a central green parallelogram in median two-fifths, narrowly prolonged medially to the

apex, but only slightly irregular basally, without lateral spots, the punctures strong and close-set basally and apically, virtually wanting medially from side to side; elytra but little longer than wide, inflated basally, where they are fully a fourth wider than the prothorax, each with fifteen coarse and deeply impressed striae, which are only moderately coarsely but very closely punctate, the green metallic spots less developed than in *tessellatum*, the sutural interval evenly dark to within a short distance of the apex, where it fades; outer spot of the second row resolved into two small elongate dashes, the third row resolved into five elongate spots; under surface blackish-brown, the abdomen paler. Length, 8.5 mm.; width, 5.2 mm. Texas.

This is by far the largest species of the genus known to me.

*O. ellipticum*, n. subsp.—Similar to *tessellatum* throughout but larger and more elongate, the elytra of a more pointed ogival outline behind; head similar in coloration and sculpture, except that the few basal punctures are finer; prothorax much less abbreviated, but little, though obviously, more than twice as wide as its median length, similar in colour and sculpture, except that the punctures are much finer; elytra similar in general form and sculpture but less abbreviated, the sutural dark vitta not enlarged before the apex, but gradually disappearing without the least dilatation near the tip; outer reniform spot of the second row almost divided; outer part of the third row resolved into a long and a short dash. Length, 7.0 mm.; width, 4.3 mm. Rhode Island.

Very closely allied to the more western *tessellatum*, and probably more in the nature of a subspecies; the comparisons are drawn from the female in each instance.

*O. brevipenne*, n. sp.—Form and sculpture nearly as in *robustum*, Horn, but differing in maculation and in its smaller size; head pale, the base throughout the width, and extending narrowly along the eyes to their middle and with two obtuse median spurs, metallic-green, the green areas alone punctate, the punctures moderate; prothorax fully two and one-half times as wide as long, strongly trapezoidal, with evenly-arcuate sides almost continuing the sides of the elytra, having, rather behind the middle, a large transverse medial and at each side a small green spot, the former broadly continued to the apex, also continued almost or quite to the base at each of its ends and in the middle, the punctures strong and close-set

basally and apically, with a few scattered between the central and each lateral spot; elytra rather shorter than wide, almost evenly rounded, not much inflated basally, each with fourteen fine and feebly impressed striae bearing coarse and widely-separated punctures, becoming smaller but still distinct apically, the common entire sutural green vitta strongly dilated before the apex into a transversely rhomboidal spot; each elytron also with one subscutellar and three well-developed subhumeral green spots at base, the second row as in *tessellatum*, but with the two large spots more rounded, the third band nearly as in that species, but less irregular and broadening much more suturally, there joining the second row and also the subapical rhomboid. Length, 6.0 mm.; width, 4.6 mm. Ohio.

*Robustum*, from the more boreal Nova Scotia region, is much less maculate than *brevipenne*, and is said to more nearly resemble *gilæ* in that respect; the sutural dark vitta wholly disappears behind the third row, and is not expanded into a spot, the latter being greatly developed in the present species, which usually bears the name *robustum* in collections. The dark metallic-green coloration prevails in *brevipenne*, but is much less in area than the pale regions in *robustum*.

*Blethisa*, Bon.

*B. Columbica*, n. sp.—Form nearly as in *multipunctata*, but larger and less metallic, deep black, polished, with very feeble violaceous lustre, more greenish-seneous in the marginal gutters of the elytra; head nearly as in *multipunctata*, but larger and with much stouter antennæ; prothorax as in that species, but less punctate in the lateral gutters; elytra more oval and less parallel-sided, with somewhat uneven but distinct, rather coarse and distinctly punctate striae, the foveæ much smaller, about five on the third and two or three on the fifth interval; side piece of the prosternum with small but evident punctures, becoming obsolete anteriorly; anterior male tarsi rather more elongate. Length, ♂, 11.0 mm.; width, 4.4 mm. British Columbia.

Differs from *multipunctata* as stated above, and from *Oregona* in its smaller size and partially punctate sides of the prosternum.

*Pseudomorpha*, Kirby.

The species of this genus are as active in flight as *Cicindela*, and are rather difficult to capture; for this reason they may not be actually so rare as might be assumed.

*P. castanea*, n. sp.—Body parallel, moderately and evenly convex, rather stout in build, strongly shining, with a feebly alutaceous or sub-opalescent lustre, very dark blackish-castaneous above, less dark and more rufo-castaneous beneath; head large, transversely trapezoidal, smooth, with a few very fine scattered pubiferous punctures toward the base of the vertex, the occiput smooth; prothorax fully twice as wide as long, feebly trapezoidal, with almost evenly and moderately arcuate sides; apex and base truncate, the latter arcuate laterally, the basal angles rounded; surface sparsely punctate throughout, very finely medially, less so and more asperately laterally, the punctures medially bearing very short erect stiff hairs, becoming longer but still very short laterally, the sides explanate, concave except basally; scutellum polished, transversely triangular; elytra one-half longer than wide, not quite as wide as the prothorax, the sides straight and parallel, broadly rounding at the humeri and becoming feebly convergent in less than apical third to the broadly-rounded external angles, the apex broadly arcuato-truncate, the sutural angles rounded; surface evenly convex, each with nine even unimpressed series of small asperate punctures bearing stiff erect setæ, the punctures subequal throughout, except the ninth and a partial tenth series on the flanks, which are very minute and barely traceable; there is also a partial basal series between the first and second; fine, acute lateral margins with a series of close-set asperate setigerous punctures on and not within the edge itself; first abdominal suture abruptly arcuate at the middle, the second segment, and, to a less degree, the third and fourth finely and closely punctate, and with short decumbent fulvous pubescence except laterally, and also with a single irregular transverse series of fine close setigerous punctures. Length, 9.8 mm.; width, 4.0 mm. Utah (Stockton).

This species may be placed near the Arizonian *angustata*, Horn,—printed in table, text and over the original description “*angustata*”; but presumably *angustata* is meant. It differs, however, in the absence of any indication of the subsutural row of larger punctures characterizing that species and in its decidedly larger size.

#### LUCANIDÆ.

##### *Dorcus*, MacL.

The following appears to be a form worthy of a name, though closely related to *parallelus*:

*D. nanus*, n. subsp.—Similar in form, coloration and general structure to *parallelus*, but very much smaller and differing (♂), in having the head

coarsely and closely punctate throughout, except in a small patch above each eye and on the occiput, the pronotum not abruptly coarsely punctate near the sides as in that species, but with the coarse punctures extending inwardly broadly, becoming very gradually smaller medially; the elytral sulci are deeper, more close-set and more evenly spaced, the sulci throughout as wide as the intervals or nearly so; differing (♀) in its much smaller size, narrower form and in the deeper, more close-set and more evenly-spaced elytral sulci; the tarsal claws are decidedly smaller in both sexes. Length, 16.0 mm.; width, 6.6-7.0 mm. Two specimens from the Levette cabinet, probably collected in Indiana.

*Platycerus*, Geoff.

*Cærulescens*, of LeConte, is a species from southern California that has been wholly lost sight of in recent years, and probably considered a synonym of *Oregonensis*. That it is a synonym of that species seems improbable, however, as the basal angles of the male prothorax are said to be obtuse but not at all rounded; they are distinctly rounded in *Oregonensis*, and the localities are very different. I would be inclined to regard *chalybeus* as synonymous with *cærulescens*, were it not for the facts that it is very much smaller in size and has the basal angles of the male prothorax slightly prominent, subeverted and right to slightly acute.

The forms allied to *quercus* are difficult to define satisfactorily, but I note a number of very evident modifications of that type, some of which are probably specific in value. *Quercus*, occurring abundantly in Indiana, is a small species, the male narrow, parallel, with the head only moderately coarsely or closely punctate, the prothorax scarcely more than one-half wider than long, the sides converging anteriorly more or less from the angulation near basal third, with the side margins but narrowly reflexed, the punctures close-set but only moderately coarse; the elytra three-fifths longer than wide, only moderately coarsely punctate to somewhat finely so and obscurely punctato-striate. The female is larger, more convex, more coarsely sculptured, paler and more venous in lustre and with the prothorax less transverse and more narrowed anteriorly. The length and width of five males before me, including the mandibles, are 8.0-10.0 by 2.9-3.5 mm.; the corresponding dimensions of six females being 8.0-10.0 by 3.0-4.1 mm. The following are two modifications of this type, which, to be on the safe side, I will call subspecies for the present; they are described from the male:

*P. angustus*, n. subsp.—Still narrower and rather more depressed than *quercus*, the head more coarsely and closely cibrate; prothorax one-half wider than long, the sides parallel, arcuately rounding near the apex and somewhat abruptly converging in about basal third, the basal angles obtuse and narrowly rounded; surface punctured as in *quercus*, but with the side margins twice as broadly reflexed, this being a very conspicuous character; elytra still more coarsely sculptured than in *quercus* and more obscurely striate. Length, ♂, 8.7 mm.; width, 2.75 mm. A single specimen from the Levette cabinet, probably collected in Colorado.

*P. Iowanus*, n. subsp.—Nearly similar to *quercus* but smaller, more abbreviated and of a deeper and more polished, more greenish-black colour; mandibles, when fully developed, shorter, more prominent externally near the base and with a deeper external sinus, the head more coarsely and densely cibrate; prothorax nearly as in *quercus* but more transverse, being three-fourths wider than long and more densely, somewhat more coarsely punctate; elytra shorter, not more than one-half longer than wide, coarsely, deeply and closely punctate, and with impressed striae more or less lost externally; the female differs from the male in the same general direction as in *quercus*, but the colour is deep greenish black, and not paler and more æneous, though the legs and abdomen are pale rufous, a character wholly wanting in the male; the elytra are relatively more elongate and the prothorax shorter than in the female of *quercus*. Length, ♂, ♀, 8.5-9.0 mm.; width, 3.0-3.35 mm. Iowa (Keokuk).

The following is apparently specifically different from *quercus*:

*P. peregrinus*, n. sp.—Larger and rather stouter than *quercus*, moderately shining, black above and beneath, the elytra somewhat ænescent; head strongly, unevenly and, on the whole, not very closely punctate, the fully-developed mandibles longer, less bent and less prominent basally than in *quercus*, the antennæ nearly similar, though with the last joint less oblique; prothorax two-thirds wider than long, the sides converging and perfectly straight from the obtuse angulation at basal third to the apex, converging basally, the angles obtuse and blunt; surface punctured as in *quercus*, the side margins very narrowly reflexed; elytra nearly as in *quercus*, except that the punctures are coarser, more rounded and less lineiform. Length, ♂, 11.5 mm.; width, 3.8 mm. Oregon.

Differs from *quercus* principally in its larger size, obtusely rounded basal angles of the prothorax, coarser sculpture, form of the fully developed mandibles and other characters.

## SCARABÆIDÆ.

*Cænonycha*, Horn.

The following is an insular form with vestigial wings:

*C. clementina*, n. sp.—Form narrowly oblong, convex, dilated posteriorly, reddish-brown, alutaceous, the female larger, paler and more shining; head densely but rather superficially punctate, more deeply on the vertex and more evidently in the female, the clypeus reflexed at apex, prominently dentate at each angle, sinuato-truncate between the angles; prothorax very nearly twice as wide as long, widest behind the middle, the sides strongly rounded, converging and straight anteriorly, the basal angles obsolete, very broadly and evenly rounded; surface finely but strongly, evenly and not very closely punctate; and with short inconspicuous hairs; elytra about one-half longer than wide, or a little more (♀), finely, evenly and rather loosely punctate and with very short hairs, each with two or three fine and very feeble raised lines; both claws of all the tarsi finely and very minutely bifid at tip, the female similar in this respect, but with the claws even more minutely or unequally bifid. Length, ♂, ♀, 8.0–9.3 mm.; width, 4.1–5.0 mm. Island of San Clemente. Five males and two females.

There are a few very stiff erect setæ along the side margins of the prothorax, and also just behind the elytral humeri. This species differs from *socialis*, Horn, an inhabitant of Guadalupe Island, in its smaller size and absence of sinuation in the sides of the prothorax toward the prominent apical angles; this sinus is, however, feebly evident in the female. Dr. Horn states that the antennæ in *socialis* are 9-jointed; the antennæ in both sexes of the present species are very plainly 10-jointed, and I am disposed, therefore, to doubt the accuracy of the statement referred to (Tr. Am. Ent. Soc., 1876, p. 192). The mandibles are bifid at tip, the inner lobe also very feebly bifid.

*Phobetus*, Lec.

I do not know that a very singular character of this genus has been hitherto noticed; the middle tibiae of all my specimens, and possibly therefore in both sexes, have a small reflexed uncus on the inner side of the apex. The antennæ in all of the nine examples at present before me consist of nine joints, which it might be inferred is constant in both sexes, though the male and female seem to be not readily differentiated, unless my material is all of one sex, which is somewhat improbable. The

following is allied rather closely to *comatus*, but is a larger and differently coloured species:

*P. centralis*, n. sp.—Stouter than *comatus*, highly polished, pale luteo-flavate, the head dusky except anteriorly, the pronotum with a large central piceous cloud, and the elytra more or less piceous along the suture and side margins; pubescence long and dense beneath, long but sparse on the pronotum anteriorly and at the base of the elytra, the lateral fimbriae long and dense; head less coarsely punctate; prothorax with more numerous coarse punctures anteriorly, and with the fine punctures more distinct; elytra feebly but inconstantly sculptured, with the three or four double lines frequently wholly obsolete. Length, 14.5–16.0 mm.; width, 7.5–8.2 mm. California (Kaweah, Tulare Co., 1,000 feet).

*Comatus* is more northern in habitat, being abundant in the regions about Sacramento. *Testaceus*, of LeConte, from the Island of Sta. Cruz (Proc. Acad. Phila., VI, p. 346), is probably, at any rate, a well-marked subspecies of *comatus*, and should be continued in our lists as such; the antennæ are described as 10-jointed in the male, but, according to that author, they are 9-jointed in the female. So possibly all my specimens are females. The subject would seem to be worthy of renewed study by those having more ample material.

*Dyscinetus*, Harold.

The following is much larger and stouter than *trachypygus*, Burm.:

*D. puncticauda*, n. sp.—General characters as in *trachypygus* but more finely and sparsely sculptured, black, polished; head similar, but with the clypeus not finely and sparsely punctured but coarsely, though superficially and confluent, punctato-rugose; prothorax rather more transverse, finely and very sparsely punctate; elytra similar, but with the double series of punctures scarcely at all impressed; pygidium (♂) highly polished, coarsely and sparsely punctured throughout, the punctures becoming close and irregularly confused near the lateral angles. Length, ♂, 18.5–20.0 mm.; width, 9.0–10.7 mm. Kansas (Hamilton Co.), F. H. Snow.

The sculpture of the pygidium differs entirely from that of *trachypygus*, but resembles that of the West Indian *picipes*, Burm., which is said to occur also in Mexico by Bates. I am inclined, however, to think that Bates had the present species before him, or one closely allied, and not the true *picipes*, as the legs in *puncticauda* are black or concolorous, and the anterior margin of the clypeus, though broadly sinuous, could not by

any means be described as "zweizackig." Burmeister, moreover, states of *picipes* that the hind coxae, as well as the pygidium, are coarsely punctured; the hind coxae here are finely, very sparsely punctured; the length given for *picipes* is 8-9 lines, or 16-18 mm. Bates states that, in the Mexican representatives, the inner small spur of the divided apex of the broad claw of the anterior male tarsus is divergent; it could scarcely be termed divergent in the present species, as it is virtually continuous in direction with the side margin of the claw.

*Ligyrus*, Burm.

*L. Californicus*, n. sp.—Much larger, stouter and more polished than *gibbosus*, and with shallower sculpture, castaneo-rufous; head finely, densely punctato-rugose, with the transverse carina strong, acute and straight; prothorax with the usual apical indentation and short acute tubercle, the punctures strong and rather numerous; elytra with the series of small punctures scarcely impressed. Length, 15.0-16.5 mm.; width, 9.2-10.0 mm. Southern California.

Differs from *gibbosus* in its larger size and stouter build, smoother surface, and especially in the much more dilated posterior tibiae.

*L. spissipes*, n. sp.—Form nearly as in the last but less robust and more coarsely and deeply sculptured, similar in colour; head less finely and not so densely punctato-rugose, the carina more noticeably depressed medially, particularly in the male; prothorax more abbreviated, the punctures similarly coarse but not quite so numerous, decidedly sparse; elytra with the striae of coarser punctures evidently impressed. Length, 12.2-15.0 mm.; width, 7.9-9.2 mm. New Mexico.

This species is also distinguished from *gibbosus* by the short and very rapidly and broadly dilated hind tibiae.

*L. rugiceps*, Lec., belongs to the genus *Euetheola*, of Bates.

*Valgus*, Scriba.

*V. minutus*, n. sp.—Similar in general form to *squamiger*, but very much smaller and with different vestiture; red-brown in colour, moderately shining; head with erect scales, dense posteriorly, very much finer and sparser anteriorly; prothorax as long as wide, narrowed anteriorly, with semi-erect scales, coarse and dense laterally toward base and on the two elevated ridges, fine and sparser elsewhere; elytra with rather uneven approximate series of small rounded tubercles, which are very close-set, each with a minute central puncture from which proceeds a slender sub-erect scale, the scales of the series directed outwardly; female with the

corneous process of the pygidium rather rapidly pointed and about half as long as the elytra. Length, 3.9-4.2 mm.; width, 2.0-2.25 mm. Louisiana (Vowell's Mill), C. W. Leng.

This is one of the more minute of the Scarabæidæ.

*Roplisa*, n. gen.

This genus resembles *Trigonopeltastes* in external facies, but is well distinguished by its 9-jointed antennæ, these organs being plainly 10-jointed in both sexes of *Trigonopeltastes delta*. The body is more narrowly elongate-oval, similarly rather flattened above and with the elytra more irregularly, and in part obsoletely, striate. The head is smaller, the eyes much less developed and the tarsi are very much shorter, the posterior being not longer than the tibæ, with the claws much smaller. The type may be described as follows:

*R. floridana*, n. sp.—Dark brownish-testaceous throughout, the elytra clouded with a darker tint, the head except anteriorly and the pronotum black and shining, the elytra opaque; head finely, densely punctato-rugose, the clypeus parallel and rounded at the sides, nearly as long as wide, the angles broadly rounded, the median part of the apex slightly sinuate; eyes small, not prominent; antennæ short, the club oval; prothorax twice as wide as the head, slightly wider than long, somewhat wider before the middle than at base, the sides rapidly converging anteriorly; surface glabrous, strongly, sparsely punctate, deeply impressed and with dense yellow indument along all the margins, broadening near the basal angles, and also in two nearly straight oblique fossæ from near the margin before the middle to near the median line at basal fourth; scutellum well developed, as long as wide, with pale indument; elytra rather longer than wide, broadly arcuate at the sides, slightly wider than the prothorax, the yellow indument present in a short transverse depression slightly behind the scutellum, extending anteriorly along the suture to the latter; striæ near the suture entire and abruptly scratch-like, very fine but somewhat depressed; pygidium vertical, large, closely, finely, biobliquely rugulose, with indument laterally and basally; anterior tibiæ with a single short, broad, angular external tooth only slightly beyond the middle, the apex acute but only moderately everted. Length, 7.0-8.4 mm.; width, 3.3-4.0 mm. Florida.

The two type specimens differ much in size, but are of undetermined sex; the anterior tibiæ are similar in each.

## NOTES ON PACHYBRACHYS AND DESCRIPTIONS OF NEW SPECIES.

BY FRED. C. BOWDITCH, BROOKLINE, MASS.

(Continued from page 244.)

*Pachybrachys marginipennis*, nov. sp.—The size and general colour of *livens*, Lec., dull yellow, elytra with very narrow dark edging, and with brown or livid punctures, largely diffuse. Length,  $1\frac{1}{2}$ – $2\frac{1}{2}$  mm.

Head flat, yellowish, moderately punctured, more thickly on the darker marks in the middle and on the vertex; eyes moderately distant (much nearer than *celatus*), nearer in ♂; antennæ of ♂ reaching a trifle beyond the middle of the abdomen, of ♀ to beyond the hind coxae; five or six basal joints colour of head, rest dark brown, thorax somewhat tubularly narrowed in front and slightly constricted behind, broad, depressed in front of scutellum, colour same as the head, with the basal part of the standard M very indistinctly suffused in livid; in its most distinct form it is three poorly-defined spots at the base, from that form it passes to where the livid colour may be almost generally suffused; sides of thorax subangulate, especially noticeable in ♀, slightly sinuate towards the rear in ♂, hind angles very sharp, fine and nearly rectangular; elytra parallel, roller-shaped, finely and diffusely punctured, the punctures towards the sides and rear arranged in lines so as to give the appearance of flat intervals at the sides and on the convexity. The third, fifth and humeral intervals are the most noticeable, the suture and lateral edge is very narrowly black, the latter sometimes broken; lobe moderate, with a fine row of marginal punctures on the curve, marginal striæ with a very moderate curve; below dark brown, epimera, sides of abdomen and last ventral segments colour of elytra; sometimes this yellow embraces the metasternum and nearly all the abdomen, leaving only a brown marking on the side of the metasternum, and the rest of the surface with more or less livid clouds, with darker clouds on thighs; the yellow of the pygidium is complete except that central and two side spots are darker.

Three ♂'s, two ♀'s, San Diego, California. Type coll., Bowditch.

*Livens*, Lec., differs from this species by the absence of a dark margin to the elytra, and in having a well-defined median livid cloud on the thorax; the eyes in *livens* are also more distant. *Celatus*, Lec., has more distant eyes and a well-marked shield.

*Pachybrachys punctatus*, nov. sp.—Same general form and colour as *livens*, Lec., but much larger; dull yellow, with livid marks on thorax, and livid-coloured, mostly diffused punctures on elytra. Length,  $2$ – $2\frac{1}{2}$  mm.

August, 1909

Head rather large, flat, moderately coarsely and thickly punctured, especially so on the livid frontal mark and vertex; eyes distant in both sexes, slightly nearer in ♂; antennæ yellow, darker after about the fifth joint, reaching a little beyond the hind coxae in ♂, shorter in ♀; thorax yellow, broad, tubularly-narrowed in front and slightly constricted behind; standard M in livid clouds, but very diffuse, the central one somewhat following the *livens* pattern, finely punctured; more closely in livid marks; edge subangulate, in some ♀ specimens slightly sinuate in rear; hind angles sharply obtuse; elytra of the form of *livens*, but yellow, with suture narrowly black; everywhere, except the rear of the convexity and apex, diffusely punctate, with here and there traces of the third, fifth and humeral spaces; punctures more crowded in scutellar area, and sometimes a few traces of brown on the inside standard spots. There is also a suggestion in some examples of an elytral shield; lobe medium, very gradually narrowed behind, with a small row of punctures on the curve, below with legs pale, with livid clouds; the epimera, sides of abdomen and pygidium being picked out with paler colour; the top of the back, which is black, is apt to show behind the elytra in the ♀, and forms a dark middle and two side spots to the pygidium.

Five ♀'s, 1 ♂, San Bernardino Mts.; 2 ♀'s, Independence, California. Type coll., Bowditch.

Very close to *livens*, Lec., but larger, and the punctuation of the elytra not nearly as regular, and lacks the smooth, shiny look of *livens*.

*Pachybrachys Arizonensis*, nov. sp.—Size rather large, elongate, parallel, pale or reddish-yellow, with livid punctures and a faint general livid colour. Length,  $2\frac{3}{4}$ - $3\frac{1}{2}$  mm.

Head yellow, with livid frontal line and vertex, most prominent in ♀; eyes moderately distant, a trifle nearer in ♂ than ♀; punctures thick, fine, crowded in the livid marks; antennæ yellow, very gradually and slightly darker towards the end, reaching beyond the hind coxae in ♂, not quite so long in ♀; thorax broader than long, yellow, with standard M very lightly suffused in livid, but amount of colour varying considerably, lightly and finely punctured, but more thickly in livid markings; edge very lightly subangulate in ♂, considerably more pronounced in ♀; hind angles sharp, finely obtuse; elytra elongate, parallel, the three standard intervals pretty regularly defined, also the other intervals on the convexity; punctures fine, same as thorax, here and there in other places than as above stated, arranged in lines, but always more or less broken and irregular, and more so in ♀ than ♂, and showing sometimes a biseriate

tendency at the base; apex in both sexes smooth, except for marginal stria, which is barely sinuate behind the lobe, the latter is well developed, especially in the ♀, and almost without punctures; below pallid with sericeous pubescence; legs pale, ♀ fossa deep and well marked.

Two ♂'s, 3 ♀'s, Prescott, Arizona; 4 ♀'s, Douglas Co., Kansas. Type coll., Bowditch.

Very similar to *punctatus*, nov. sp., but the general form is more elongate parallel and not as stout; the antennæ are not so dark, nor do any of my specimens show a black sutural margin, as is the case in *punctatus*; the ♂'s in *Arizonensis* show these features best and are more pallid.

*Pachybrachys Balsas*, n. sp.—Body above and legs bright yellow, below, except the thorax, black. Length,  $2\frac{1}{4}$ – $3\frac{3}{4}$  mm.

Head finely punctured with frontal dark mark, eyes of ♂ approximated, more than ♀, antennæ of ♂ reaching nearly the middle of abdomen, of ♀ to hind coxa, yellow for five or six joints, then becoming darker; thorax somewhat narrowed in front, finely and diffusely punctate, with deep depression in rear, and a slightly depressed and discoloured spot on either side, there being a similar discolouration touching the depression before the scutel; elytra with the first stria consisting of twelve or fifteen fine punctures irregular, also two or three of the striae behind the humerus slightly irregular, all of the others regular; unicolourous, so that the general appearance of the species at first sight is yellow, regularly striate; none of my specimens have any cloud of colour; marginal stria straight after passing the humeral curve, lobe small, gradually narrowed behind, with a small row of well-marked marginal punctures on the curve; legs yellow, with whitish clouds on the thighs, head and thorax below and epimera are yellow or rufous, the remainder of the body is plain dull black, covered with scanty, whitish pubescence.

Rio Balsas Guerrero, Mexico, two ♂'s, three ♀'s, Wickham collector. Type coll., Bowditch.

The bright yellow upper and black under side readily identify this form. It would, by form and sculpture, be placed near *Xanthias*, Suff.

*Pachybrachys Peckii*, nov. sp.—Small, size of *conformis*, Dej., or *minutus*, Jac. General colour yellow, with three dark longitudinal stripes on the prothorax and fairly regular stria of black punctures on elytra. Length,  $1\frac{3}{4}$ – $2\frac{1}{2}$  mm.

Head yellow, flat, finely punctured, sparsely on the yellow portions, with an uncommonly wide dark frontal mark, forked in front and connected

with spot at vertex; eyes distant, very narrowly margined with black; antennæ dark, with basal joints paler (two or three in mature specimens), reaching to about hind coxa in ♂, shorter in ♀; thorax narrowed towards the front, yellow, closely punctate, especially on dark parts, the M taking the form of three longitudinal dark stripes, the side one sometimes enclosing a small yellow spot, and the central one a median yellow line not reaching the rear, all three stripes usually reach the rear margin, though sometimes the side ones do so only partially, the transverse depression well marked at the ends of the side stripes; the lateral yellow margin is wider and almost smooth, the edge is almost straight in ♂, slightly curved in ♀; elytra yellow, with almost regular striae of black punctures, slightly confused in the vicinity of the scutel, and the punctures so disposed as to show a biseriate tendency, the fifth and sixth rows joined just before the convexity, next pair a little longer, and last pair still longer. This gives the effect of having the fourth interval open to the tip; suture narrowly black, also a black stripe covering the humeral interval and running from the humerus nearly to tip, the rear end sometimes broken or diffused; marginal stria well curved at lobe, then straight, lobe well developed, with a fine row of black punctures on the curve, the pale part of the lobe widest in front; below black, with yellow epimera and sides of abdomen, the last segment and pygidium yellow, with central dark line, legs yellow, with more or less darker clouds. Comes near *minutus*, Jac.

Three ♂'s, 4 ♀'s, Manatee Dist., Brit. Honduras, Peck. Type coll., Bowditch.

*Pachybrachys signatus*, nov. sp.—Medium size, shining, form of *livens*, Lec.; colour whitish-yellow with black markings, which are quite variable; the typical form has on the thorax a black median mark, divided in front, similar in shape to the thoracic mark on *livens*, Lec.; the elytra have in front a black U-shaped mark with the arms resting about the middle of the base and crossing the suture just before the shield, also the rear standard spots are diffused so as to form a transverse band; these markings vary, as subsequently stated. Length 2-2½ mm.

Head light yellow, flat, with a dark frontal and vertex mark and moderately punctured, eyes distant, antennæ yellow, thorax much wider than long, somewhat narrowed in front, rather thickly and evenly punctured, transverse depression well marked before the scutel, sides subangulate in ♀, very lightly in ♂; in addition to the black mark mentioned above, there are indications of the two side M arms, and in one example the thorax is quite suffused with black, hind angles obtuse, elytra with the

scutellar area overrunning into and including the third or fourth interval and back to a point just over the convexity diffusely punctate; there is also a slight disturbance about the seventh interval at the side, the remainder is regularly punctate striate and usually a moderately well-defined shield, marginal stria very lightly curved at humerus and almost straight behind, lobe small, black, edged with a row of marginal punctures; body below dark, with the epimera, abdomen and pygidium more or less picked out in yellow or livid, the ♀'s more so than the ♂'s; legs yellow, with indefinite lighter spots on thighs.

Prescott, Arizona, 2 ♂'s, 3 ♀'s. Type coll., Bowditch.

I also refer to this species three specimens from Provo, Utah, which are somewhat larger than the foregoing and with the elytral U-mark obsolete or wanting and the legs with dark marks on the thighs; and one ♂ example from San Bernardino Mts., California, which is black on the body beneath, except the epimera and spots on the pygidium.

*Pachybrachys Sanrita*, nov. sp.—Size rather large, stout, livid or red-brown, with bright yellow spots and broken punctate striate elytra. Length 3-4 mm.

Head nearly flat, yellow, with vertex and middle branched spot, bases of antennæ and edge of labrum livid, antennæ yellow, darker towards the tip, barely reaching the middle of the body in ♀, to about the hind coxa in ♂, eyes distant; the thorax finely punctured, broad, distinctly narrowed towards the front, yellow with M in livid broadly marked, and noticeably long median yellow line; depressed behind, with a distinct antescutellar lobe and depressed area in the ends of the M arms, sides of thorax just barely deviated from a straight line in ♂, incurved towards the rear, plainly angulate in ♀; elytra yellow, broad, somewhat depressed, punctures closer than the thorax, confused in the scutellar region, third and fifth intervals fairly well defined, then all are broken up to the two side intervals, which are broad and somewhat irregular, the punctures show a tendency to a biseriate arrangement, which is especially noticeable at the base; the standard spots suffused into livid transverse bands with the edges diffuse in places, leaving two spots on either side, the tip, the base keel (and interval roots from it) and a small sutural shield prominent bright yellow; the marginal stria very moderately curved round the humerus, sinuate in rear, lobe wide and well marked with a row of strong punctures on the curve, below livid brown, with the epimera, sides of abdomen and pygidium picked out in whitish, prosternum sulcate, legs yellowish-red, with light spots on ends of the thighs.

Two ♂'s, 1 ♀, Santa Rita Mts., Arizona. Type coll., Bowditch.

*Pachybrachys Snowi*, nov. sp.—Large, stout, cylindrical, yellow, with red-brown markings, or sometimes nearly black. Length 3-4½ mm. Head flat, yellow, with usual vertex and central line, antennal spots and margin of labrum in red-brown, finely and rather thickly punctured, antennæ short and frail, reaching about the middle of the body; eyes in ♀ comparatively near, thorax much broader than long, shining, narrowed in front so as to appear swollen behind, moderately and in parts sparsely punctured with medium-sized reddish punctures, M broadly and fairly well defined in the prevailing red-brown, with a smooth median yellow line reaching beyond the middle, rear with only indications of a transverse line and showing only a very moderate antescutellar lobe; the transverse depression becomes vague at the sides and disappears in the arms of the M, the lateral edge, which is angulate, has the usual marginal stria distant from the margin, leaving a distinct wide smooth border, slightly tapered at the front, hind angles obtuse, rounded; elytra stout, broad, slightly compressed at the sides, yellow, with brown punctures and spots, scutel broad and truncate, forward reflexed edge of elytra sharp and very well marked, punctuation coarse and diffuse except towards the rear and sides, where it falls into rows, with the resulting broad and rather convex costæ, outside standard spots are well marked in brown-red, the rear ones being connected with the inside spots, forming a broken band across the convexity; the middle spots are also somewhat joined, the anterior inside spot is diffuse and the irregular broken yellow, smooth intervals are rather noticeably large towards the side and middle rear, marginal stria with a deep curve around the humerus and abruptly sinuate behind, lobe wide, with a sparse row of large punctures on the edge, below red-brown picked out with lighter on the epimera, sides of abdomen and pygidium, fossa of ♀ a deep round pit, legs yellow-brown, with darker ring on thighs.

Prescott, Baboquivaria Mts., Santa Rita Mts., Douglas, Arizona.

Some of the examples are largely suffused with black, but except in colour they do not seem to differ. The largest of our native forms; named after my friend, the late Prof. Snow.

*Pachybrachys crassus*, nov. sp.—Stout, cylinder-shaped, pale yellowish white, surface dull, with livid punctures, which are finer on prothorax and very coarse on the elytra. Length, 4 mm.

Head yellow, convex in front, with well-marked livid central line, thickly punctured except on the yellow parts, eyes moderately distant in ♀, very narrowly margined with livid, antennæ frail and thin, about half

the length of the body, dark towards the tip; thorax much broadre than long, moderately narrowed towards the front, not one-half as long as the elytra, with M very diffusely marked and with moderately coarse, thickly-placed livid punctures, remainder of surface sparingly punctate, some of the punctures, notably in the yellow side margin, not being coloured with livid, transverse depression very well marked behind, but the depressed area at the end being diffused and not as well marked as in the following species (*cylindricus*), sides subangulate; elytra stout, with very coarse livid punctures, which are confused around the scutel, also in the fourth interval at the base and on the sixth and seventh intervals as far as the convexity—otherwise, arranged in regular rows forming punctate striae, especially deep and well marked at the side and behind, the third and fourth intervals have a tendency to widen where the shield begins—the general appearance is rather regularly punctate striate, tip plain, marginal stria lightly sinuate behind the lobe, which is broad and well developed, with a few marginal punctures in the curve, the forward edge at the base of the elytra is raised in a sharp edge; body below thickly silvery pubescent, livid with yellowish epimere and pygidium, legs yellow, with usual darker parts in livid, fossa of ♀ deep, longitudinal shining.

One ♀, St. George, Utah, Wickham. Type coll., Bowditch.

*Pachybrachys cylindricus*, nov. sp.—Large, cylinder-shaped, finely punctured, shining yellow, with standard brown marks on elytra. Length, 3-4½ mm.

Head with convex front, finely and sparsely punctate, badly defined livid central line, but with vertex spot well marked, eyes distant in both sexes, but most so in ♀ and very narrowly margined with livid on the upper side, antennæ yellow, gradually darker to tip, reaching the hind coxa in ♂, shorter, in ♀. Thorax yellow, very little narrowed in front, smooth, very lightly and finely punctured, transverse impression well marked, with its terminations on each side ending in depressed areas, especially well marked in ♀; M fairly well marked in ♂, rather diffuse in female, the ends of sides of M coincide with the depressed areas, sides very slightly curved in ♂, subangulate in ♀; elytra a trifle wider than the thorax, yellow, with coarser livid punctures, and the standard spots which have a tendency to form into transverse bands of brown livid; the punctuation is confused about the scutel, the third and fifth intervals are pretty well defined, so that the punctures on either side form fairly regular striae, with a well-defined shield in the usual place; between the fifth and humeral intervals the striae are much broken, as far as the

convexity ; this leaves the two lateral intervals and all the convexity and rear regularly and deeply punctate striate, the tip is smooth, marginal stria sinuate, the lobe well developed, with well-defined row of marginal punctures on the curve, below lightly pubescent, with yellow legs, with a tendency to have the middle parts of the body livid, pygidium yellow ; the dark part of the last abdominal segment is continued over the pygidium on three dark points, the fossa of ♀ deep, long and shiny, rather pointed in front.

♂, ♀, Prescott, Arizona. Type coll., Bowditch.

With the above I associate a ♀ specimen from Chad's Ranch, Utah, which differs in the thorax having no M, but only the transverse rear markings with the end depressions strongly marked, the elytra are yellow and have only the humerus and two round spots on the convexity livid brown, and the punctation is rather more diffuse.

*Pachybrachys tumidus*, nov. sp.—Medium sized, cylinder shaped, semi-shining, yellow with very indistinct livid clouds, elytra rather coarsely punctured and with much-swollen costæ. Length,  $2\frac{1}{2}$  mm.

Head yellow, front convex, finely punctured, with dark frontal mark and vertex, eyes distant, antennæ short and frail in ♀, barely one-half the length of the body, becoming darker at the tip, thorax wider than long, scarcely narrowed at either end, finely and irregularly punctured, yellow, the M showing as five livid clouds, which hardly connect, the outside ones forming the ends of the transverse depression, which is quite well marked, lateral edge curved ; elytra stout and parallel, diffusely punctate in the scutellar area, and with a tendency to extend the diffusion to the humerus at the side and along the suture at the rear. The basal parts of the third and fifth intervals are much attenuated, the remainder of the surface is striate punctate and the resulting intervals appear smooth and swollen, with a fairly prominent shield, everything else is regular, except there is a disturbance below the humerus, the colour is dull yellow, the standard spots give just a faint dash of livid, the shoulder knobs are dark, marginal stria, fairly well curved round the humerus and sinuate behind, lobe medium, with a row of marginal punctures, body below livid-brown, with epimera, sides of abdomen, last segment and pygidium picked out in yellow, fossa shallow and dull, legs yellow, the prosternum is wide and only slightly concave.

One ♀, Prescott, Arizona. Type coll., Bowditch.

Very like a small washed-out *cylindricus*, but elytral intervals more swollen.

(To be continued.)

*CHRYSORHANUS DORCAS.*

In the last issue of this magazine, July, page 225, in a quotation from Dr. Fletcher's letter, I am credited with giving *Hypericum perforatum* as a food-plant of *C. dorcas*. This is a mistake. In the summer of 1884 I spent my holidays on the Bruce Peninsula, and not far from Winfield Harbour. I found two shrubs, *Hypericum prolificum*, Shrubby St. John's Wort, and *Potentilla fruticosa* frequented by swarms of this butterfly. I made a fair collection of specimens, but as I could spare less than an hour, I found no larvæ, and failed to determine the food-plant. I remember going over my specimens with Dr. Fletcher, and I am sure it was "prolificum" I suggested as a food-plant, and not "perforatum." In the summer of 1887 I found the butterfly numerous on the boggy margin of Twin Lake, Port Sydney, Muskoka, where neither of the shrubs mentioned grows, and I suspected *Myrica gale* as a food-plant.

WM. BRODIE, TORONTO.

*ANOPHELES PERPLEXENS.*

BY C. S. LUDLOW, PH. D.

Laboratory of the Office of the Surgeon-General, U. S. Army, Washington, D. C.

In connection with the criticism of *A. perplexens*, mihi, made by Drs. Dyar and Knab, it may be of interest to state that Dr. Knab has re-examined my type, and now declares it to be a Pennsylvania mosquito, an aberrant specimen of *A. punctipennis*. If it be a form of *punctipennis*, it is at least so different that no one without a large series showing the intermediate forms would ever suspect it. What I have always known is that it is an *Anopheles* (as restricted by Theobald), and not a *Myzorhynchus*, which is the Philippine genus it resembled as to colouring, and if it were a Philippine specimen was quite as unique.

POSTAGE ON SPECIMENS.—It does not seem to be generally known that the postage on Entomological specimens sent by mail is one cent per two ounces—the same as book postage. It should be stated on the outside of the package that it contains only Entomological specimens. Correspondence must, of course, be sent separately. There is no customs duty on specimens coming into Canada; insect pins and books on Entomology are also free of duty.

## SOME RECENT CONTRIBUTIONS TO HEMIPTEROLOGY.

BY J. R. DE LA TORRE BUENO, WHITE PLAINS, N. Y.

For the noteworthy papers on Hemiptera to which these notes apply, I am indebted to the courtesy of the authors. They comprise "Remarques sur quelques Hemipteres de l'Amerique du Nord,"<sup>1</sup> another of Dr. G. Horváth's valuable contributions to a proper knowledge of our fauna; "Tableau Synoptique des Ambrysus et Descriptions d'Espèces nouvelles,"<sup>2</sup> by Prof. A. L. Montandon; "The Genus *Corizus*, with a Review of the North and Middle American species," by Prof. J. C. Hambleton; "Biological Notes on Oriental Hemiptera,"<sup>3</sup> by J. C. Kershaw and G. W. Kirkaldy; and last, but emphatically not least, "Some Remarks on the Phylogeny of the Hemiptera Heteroptera,"<sup>4,5</sup> by G. W. Kirkaldy.

Dr. Horváth in his article confirms many doubts I have had as to the identity of American with European species of Hemiptera. His studies have resulted in the description as new of a number of species hitherto known to us in America by the names of their European congeners, and in the classification of a number of synonymies in other forms. His deductions are, of course, supported by tenable arguments, and strengthened by his great experience and familiarity with the Palaeartic fauna. His results are summarized below:

*Corizus crassicornis*, Linné.

= *novaeboracensis*, Sign.

*Corizus viridicatus*, Uhler, is a good species, and not a synonym of *C. hyalinus*, Fabricius.

*Corizus sidæ*, Fabricius.

= *Rhopalus pictipes*, Stål.

*Nysius thymi*, Wolff.

= *Saint-Cyri*, Provancher.

= *groenlandicus*, Provancher.

*Nysius ericae*, Schilling.

= *angustatus*, Uhler.

1. 1908, Ann. Mus. Nat. Hung., VI, pp. 555-69.

2. 1909, Bull. Soc. Scie. Buc., XVII, Nos. 5 and 6, pp. 316-30.

3. 1908, Journ. Bombay Nat. Hist. Soc., XVIII, No. 3, pp. 596-98a, text figs.

1-3 and one plate.

4. 1908, CAN. ENT., XL, pp. 357-64.

5. Ann. Ent. Soc. Am., I, pp. 133-52.

*Nysius strigosus*, Uhler.

= *senecionis*, Baker (nec Schilling).

*Cymus discors*, Horváth (n. sp.).

= *tabidus*, Provancher.

= *claviculus* of American authors, not of Fallén.

*Cymodema exiguum*, Horváth.

= *tabidum* of American authors, not of Spinola.

*Ischnorhynchus geminatus*, Say.

= *Cymus franciscanus*, Stål.

= *Ischnorhynchus didymus* of American authors, not of Zetterstedt.

= *I. reseda* of American authors, not of Panzer.

*Aphanus umbrosus*, Distant.

= *Dorachosa illuminata*, var. *umbrosis*, Dist.

= *Microtoma carbonaria*, Uhler (not Rossi).

= *M. atrata* of American authors, not of Goeze.

*Uhleriola*, Horváth, new genus to contain *Rhyparochromus floralis*,

Uhler, which does not pertain to that genus, nor even to the division *Aphanaria*.

*Emblethis vicarius*, Horváth (n. sp.).

= *arenarius* of American authors, not of Fieber.

= *griseus* of American authors, not of Wolff.

= *Gonianotus marginipunctatus*, Uhler (not Wolff).

*Melanorhopala clavata*, Stål.

= *Canlacader Henshawi*, Ashm.

The Ashmeadian types were seen by Dr. Horváth when in Washington. This is sometimes wrongly attributed to the genus *Lasiacantha*, following Lethierry and Severin (Cat. Gen. Hém., III : 18).

*Aradus crenatus*, Say.

= *dilatatus*, Dufour.

*Hypselosoma*, Reuter.

= *Glyptocombus*, Heid.

*Orthotylus chlorionis*, Say.

= *Phytocoris flavosparsus*, F. Sahlberg.

*Acanthia xanthochila*, Fieber.

var. *limbosa*, Horn. A European form, now recorded for the first time from America.

*Empoasca aspersa*, Gillette & Baker.

= *tesselata*, Gillette (not Lethierry).

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*Macrosteles punctifrons*, Fallén, var. *repleta*, Fieber.  
= *Cicadula punctifrons*, var. *Americana*, Van Duz.

*Aconura*, Lethierry.  
= *Athysanella*, Baker.

*Agallia 4-punctata*, Prov.  
= *Ulopa Canadensis*, Van Duz

*Callipterus punctipennis*, Zett.  
= *Aphis betulicola*, Kalt.

Dr. Horváth's work serves to make one thing very evident, and that is the danger American Hemipterologists incur in identifying our American forms with European species, being guided only by the more or less imperfect early descriptions. It has always seemed to me that the simplest solution of the problem is to describe the American species in hand as new, and leave it to some monographer to determine the synonymy. This, of course, when the European species is not in hand for minute comparison, because if comparison be possible, there should be no room for doubt. On the other hand, certain entomologists, and they not the least eminent, have a surprising faculty for labelling things "var." or for off-handedly declaring their identity with other and more familiar forms. Hemipterology, as the least studied branch of Entomology, has been a great sufferer from this lack of discrimination.

(To be continued)

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#### COCCIDÆ FROM THE SOCIETY ISLANDS.

BY R. W. DOANE AND EVELYN HADDEN, STANFORD UNIVERSITY, CALIF.

During the summer of 1908 the senior author spent a few weeks on some of the islands of this group studying the scale insects infesting the cocoanut tree. An annotated list of these will appear in an early number of the *Jour. Eco. Ento.* The following is a list of a few other species taken on various plants, most of which we have been unable to have identified. Miss Hadden is responsible for the identifications of these insects, and should be credited with the new species of *Parlatoria*. Prof. T. D. A. Cockerell kindly examined the new species of *Aspidiotus* and pointed out some of the important characters, so that species should be credited to Cockerell and Hadden. These are the first Coccidæ recorded from these islands.

August, 1909

*Icerya Aegyptiaca* (Dougl.).

One of the most abundant species; on *Accacia* locust, guava, roses, bora and many other wild and cultivated plants. Tahiti.

*Pseudococcus pandani* (Ckll.).

A very common species on pandanus and cocoanut trees. On the latter it does considerable damage to the young trees by attacking the new leaves before they are unfolded. Tahiti, Morea, Tetioroa.

*Eucalymnatus tessellatus* (Sign.).

Common on a reed-like grass and on a low shrub in wet places. Tahiti, Tetioroa.

*Coccus frontalis* (Green).

Quite abundant on three different species of low shrubby plants. Tahiti, Tetioroa.

*Coccus longulus* (Dougl.).

Several specimens on a common wild legume. Tahiti.

*Saissetia hemisphaerica* (Toig.).

Very abundant on a common legume. Tahiti.

*Saissetia nigra* (Neitn.).

Quite common on four different low bushes. Tahiti.

*Saissetia oleæ* (Bern.).

A few specimens on the same species of legume that *S. hemisphaerica* and *C. longulus* were found on. Tahiti.

*Diaspis Boisduvalii* (Sign.).

Very abundant on cultivated roses. Tahiti.

*Hemichionaspis aspidistrae* (Sign.).

One of the most abundant scales on the cocoanut trees, being particularly abundant on the fruit. Occasionally found also on the grass and shrubs near cocoanut trees. Tahiti, Morea, Tetioroa, Flint Island, Ræatea Tahaa Huahine.

*Aspidiotus cydoniae* (Comst.).

Quite abundant on guava everywhere. Tahiti.

*Aspidiotus destructor* (Sign.).

The most abundant and destructive scale on the cocoanut trees, causing the so-called "blight." Its chalcid parasite is now controlling it quite effectively in many parts of the Islands. Same distribution as *H. Aspidistrae*.

*Aspidiotus rapax* (Comst.).

Two specimens of what seem to be this species on a weed from Flint Island.

*Aspidiotus herculeanus*, n. sp. (Fig. 8).

*Female puparium*: Scales extremely inconspicuous, resembling the bark and often covered, with the bark, by a green mould. Exuviae indicated by a white ring with a dot in the centre. Exuviae pale yellow in colour, not noticeable with the insect in situ.



FIG. 8.—*Aspidiotus herculeanus*.

chitinized portion extending anterior to the base of the lobes, and two shorter curved ones across the pygidium, near the base.

Lobes followed by a series of large, strong spines, varying in number, but usually from 8-10. A single pair of spines, some distance anterior to the first series.

A very large club-shaped gland opening at the outer base of each median lobe; these glands about  $200\ \mu$  long, with a round club-shaped end; the tube swollen, fusiform. The second pair of claviform glands, close to the first, represented by a minute rudiment. Laterad of the second lobe is a pair of small fusiform glands.

No circumgenital glands. Anal orifice close to the base of the median lobes. Arranged in a somewhat regular row, laterad of the chitinized portion of the pygidium, and scattered irregularly at the bases of the lobes are a number of cylindrical, tubular spinnerets, suddenly

narrowing to a fine thread and opening by minute-oval pores upon the dorsal surface. Spinnerets conspicuous in some specimens, in others not visible or extremely inconspicuous.

*Adult male* not known. *Habitat*, on bark of (?).

*Morganella Maskelli* (Ckll.).

Very common on guava. Tahiti.

*Chrysomphalus aonidum* (Linn.).

Moderately abundant on guava. Tahiti.

*Lepidosaphes Beckii* (Newm.).

Very abundant on orange and lemon trees. Tahiti.

*Lepidosaphes Gloverii* (Pack.).

A very abundant scale on cocoanut trees. Tahiti, Morea, Tetioroa.

*Parlatoria cinerea*, n. sp. (Fig. 9.)

*Female puparium*: Circular, slightly convex, pale brownish-gray, paler at margin. Pelicles overlapping, yellowish-brown, submarginal.

*Male puparium*: Elongate, semi-transparent, pale brownish - white. Pelicles at the anterior extremity ; brown.

*Adult female*: Rounded in front, slightly pointed behind ; broadest across abdominal segments. Abdominal segments moderately distinct, colour dull brown.

*Pygidium* with six prominent, strongly - chitinized lobes. The median lobes largest, broad at the base, with the inner sides nearly parallel ; a single notch on the inner, two notches on the outer margin. Second pair of lobes rounded at the posterior end, the outer margin slanted with two, usually distinct, notches ; the inner margin straight. Third pair of lobes resembling the second, but much shorter. Fourth lobe occasionally developed into a weakly-chitinized crenate projection. Depressions between the lobes strongly chitinized. Two chitinized depressions between the third and fourth lobes.

Two plates between the median lobes, not noticeably fringed ; two between the first and second lobes, three between the second and third.

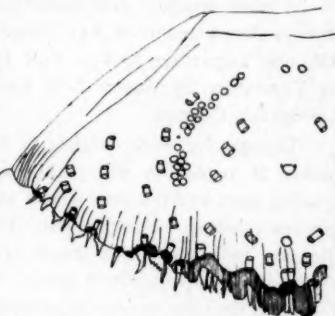


FIG. 9.—*Parlatoria cinerea*.

Toward the anterior the plates on the margin become broader and the lateral fringing more marked. The rudimentary lobes appear to form the bases of the plates.

Marginal spines situated at the base of each lobe and at intervals between the squames. Semi-lunar pores opening in depressions between the lobes. Dorsal pores rather numerous.

Circumgenital glands in four groups, occasionally five. Anterior laterals 10-14. Posterior laterals 9-12. Anterior group, when present, 1-2. Anal aperture some distance below genital aperture.

*Adult male* not known.

*Habitat*: Abundant on bark of orange tree and on a cultivated vine.

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#### BOOK NOTICE.

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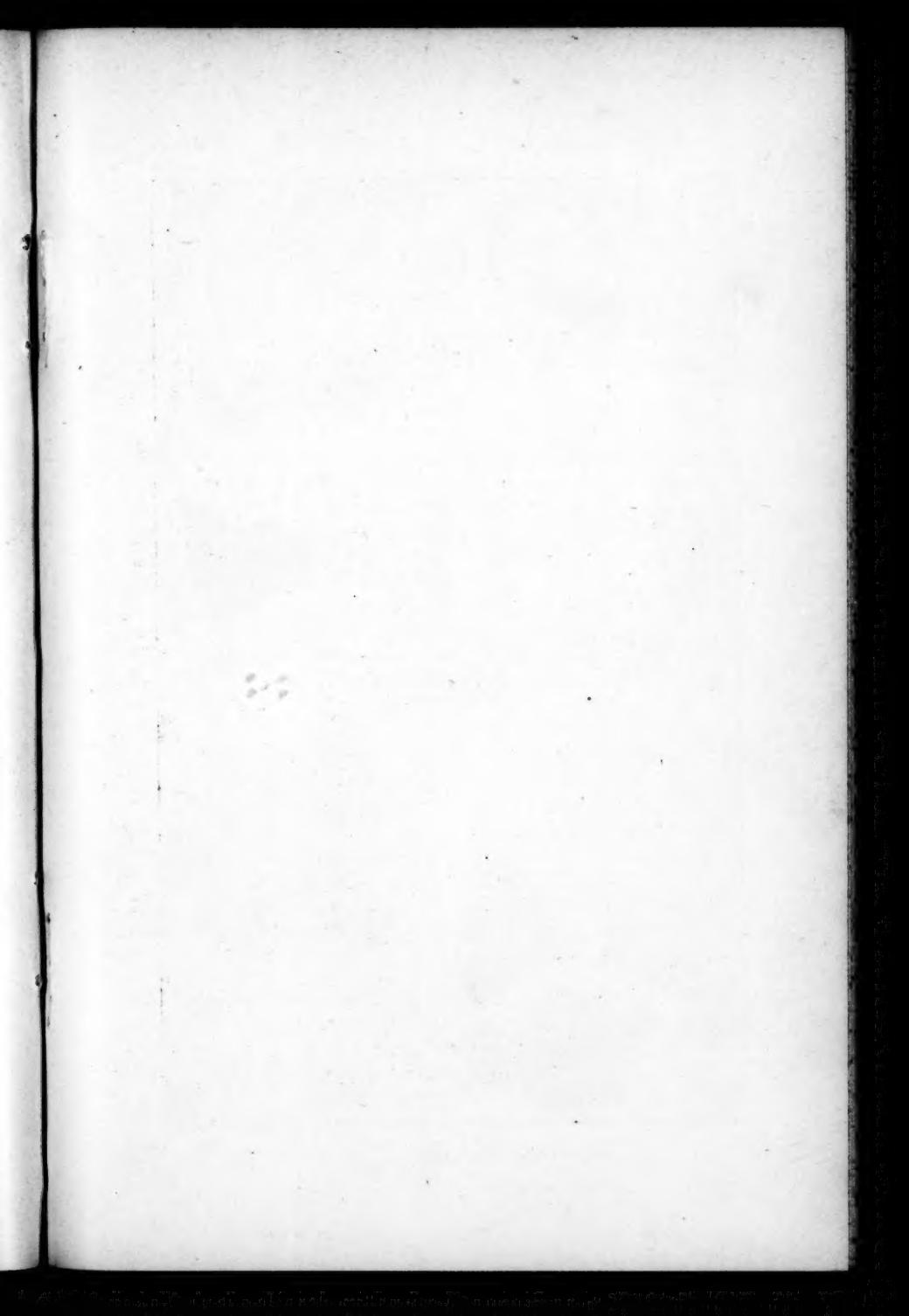
##### BULLETIN 171, ONTARIO AGRICULTURAL COLLEGE.

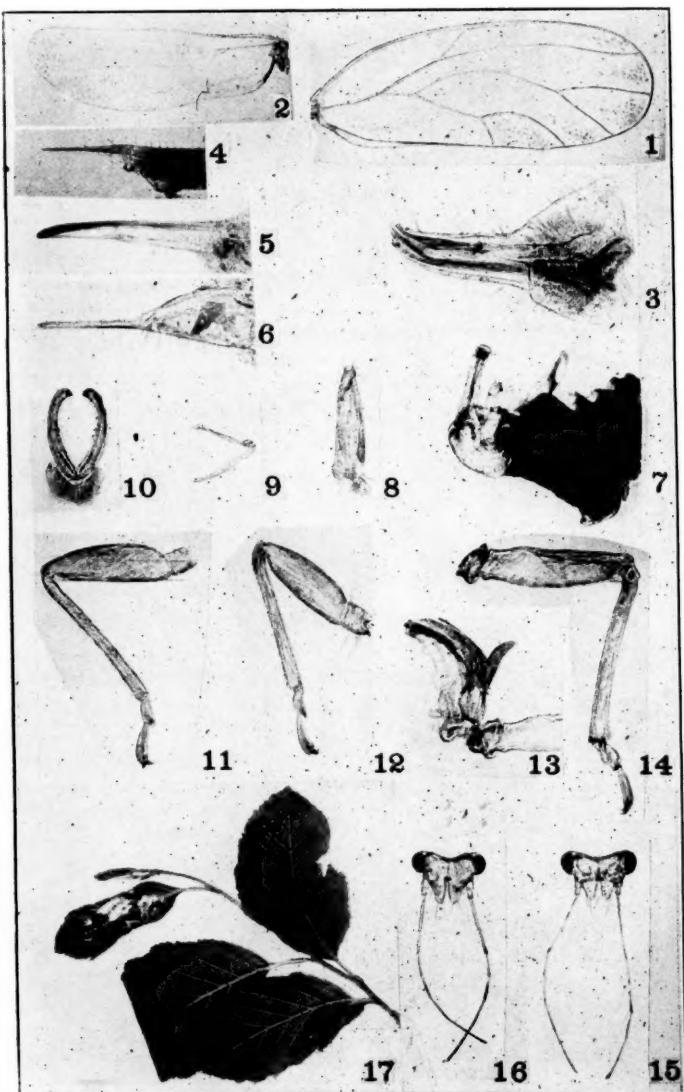
A most compact and useful publication has just been issued by the Ontario Department of Agriculture, as Bulletin 171, entitled, *Insects Affecting Vegetables*, by Rev. Prof. Bethune, and *Fungus Diseases Affecting Vegetables*, by Messrs. J. W. Eastham and J. E. Howitt, of the Ontario Agricultural College.

Though the work consists of but 64 pages, including the index, the grower of vegetables will readily find more information about his most dreaded pests and the best means of combating them than in more pretentious volumes. The first part, dealing with insects, begins by calling attention to a number of kinds of general feeders, such as aphids, cut-worms, grasshoppers, which attack almost anything that comes in their way; and then the various vegetables are treated of in alphabetical order, with their special enemies. The attacks of fungus diseases often follow in the wake of insect injuries, and these are referred to in a well-illustrated chapter arranged in the same order as the insects, with treatment recommended for each, but, as the authors say, "Generally speaking, in combating fungus diseases, methods of prevention only are practicable, as once a fungus is within a plant nothing can be done to destroy it." The remaining chapters are devoted to Insecticides and Fungicides, how to manufacture and apply them to the best advantage.

The Bulletin should be read and preserved for ready reference by everyone interested in the growing of vegetables. A. F. W.

Mailed August 9th, 1909.





DOWNY PSYLLID OF ALDER.

